DECEMBER 1939

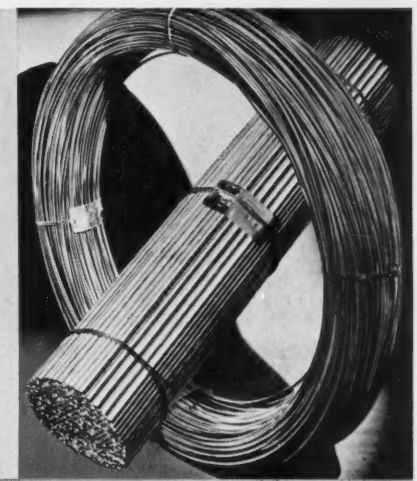
WIRE AND WIRE PRODUCTS

a slight change

MAY MAKE A BIG DIFFERENCE

A slight change in the wire—in analysis, strength, temper, gauge, finish or in coiling, knotting or crimping qualities—has made a big difference in the salability and fabricating cost of many wire products—may do the same for your products.

Tell us what you make—and what you want in wire. Republic metallurgists will go to work on your problem—and will tell you FRANKLY whether a change would be to your advantage and profit. Republic Steel Corporation—Wire Division, 7850 So. Chicago Ave., Chicago, Ill.—General Offices, Cleveland, Ohio.



REG. U. S. PAT. OFF.
REPUBLIC
STEEL
REG. U. S. PAT. OFF.

REPUBLIC WIRE

Basic Open Hearth and Bessemer (Annealed, Regular, Hard Drawn, Sul Coated, Bright, Extra Bright, Copper Coated, Liquor Finish, Galvanized), Spring Wire, *Enduro Stainless Steel Wire, *Toncan Copper Molybdenum Wire, Cold Heading Wire, Wire Rods.

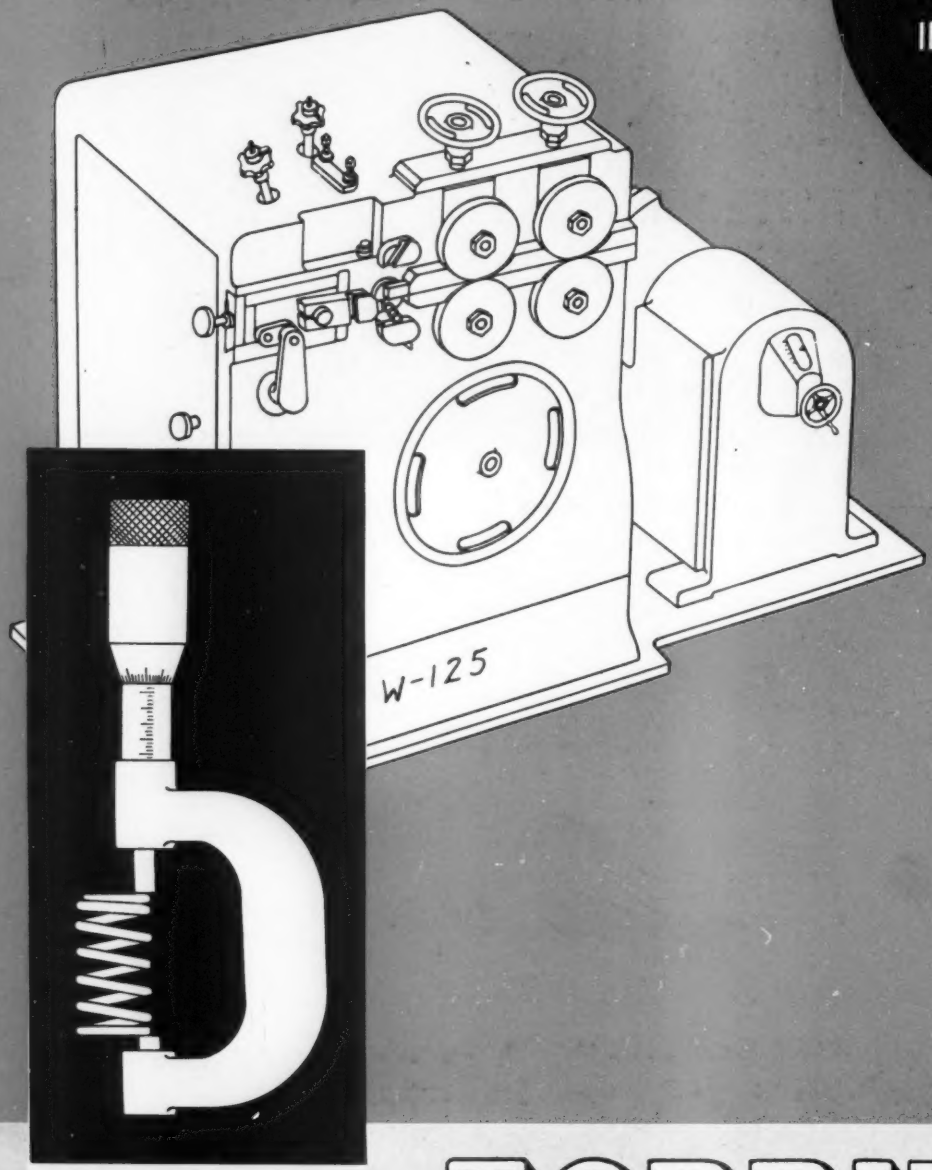
*Reg. U. S. Pat. Off.

BERGER MANUFACTURING DIVISION
NILES STEEL PRODUCTS DIVISION
UNION DRAWN STEEL DIVISION
STEEL AND TUBES DIVISION
TRUSCON STEEL COMPANY

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

Increased Production and Greater Accuracy

TO ACCOMPLISH THIS, TORRINGTON BUILT A MACHINE APPROXIMATELY 75% HEAVIER THAN THOSE USED HERETOFORE



OLD standards of production in spring making became history with the advent of the Torrington line. The increased productive capacity of these modern machines is an established fact — is being proved in service. Spring makers using Torrington equipment have increased production of some types of springs beyond their greatest expectations and have increased production of all types.

The astonishingly greater accuracy of springs produced at these new high speeds is made possible by correct weight distribution — heavy and rigid vital parts — eliminating back lash. Tools which are rigidly supported while in contact with the wire must produce a uniformly accurate coil.

TORRINGTON W-125 Segment Type Spring Coiling Machine (left) has wire diameter range from .080" to .207" and will coil springs from 0" to 74" in wire length (0" to 147" with smaller sizes of wire)

TORRINGTON W-225 Clutch Type Spring Coiling Machine is particularly adapted for springs requiring long lengths of wire. Wire diameter range is from .080" to .207". Will coil springs from 2.5" to 620" in wire length.

We would welcome the opportunity to tell you more about Torrington Spring Machines. Bulletins giving detailed specifications for a complete range of sizes will be sent on request or, if you prefer, a representative will call to explain Torrington machines and service.

TORRINGTON
SPRING MAKING MACHINES

ENGINEERED AND MANUFACTURED BY THE TORRINGTON MANUFACTURING COMPANY of TORRINGTON, CONNECTI

THREE 30-CAR TRAINLOADS

. . . drawn through one set of 3 Carboloy Dies Within .002" Tolerance!

The long, economical life of Carboloy dies is again indicated by this report from LaSalle Steel Company, Hammond, Indiana: *Each* of 3 Carboloy Dies drew a 30-car trainload of ¾" Bessemer steel bar stock, held to a tolerance of .002".

Longer life per hole size, more continuous production, faster output, closer, more uniform tolerance, and higher quality of finish are among the reasons why the LaSalle mill is now 100% equipped with Carboloy Dies for all round stock in standard sizes from ⅛" to 1¾", and hexagon standard sizes from ¼" to $1\frac{3}{16}$".

The Mark of CARBOLOY
REG. U.S. PAT. OFF.

CARBOLOY COMPANY, INC., DETROIT, MICHIGAN

CHICAGO • CLEVELAND • NEWARK • PITTSBURGH • PHILADELPHIA • WORCESTER, MASS.

AUTHORIZED DISTRIBUTORS:

Hartley Wire Die Co., Waterbury, Conn. • Canadian General Electric Co., Ltd., Toronto, Canada

CARBOLOY REG. U.S. PAT. OFF. **DRAWING AND SIZING DIES**

ENGINEERED AND MANUFACTURED BY THE TORRINGTON MANUFACTURING COMPANY of TORRINGTON, CONNECTI

For Economical Cutting-off . . . Norton Resinoid Bonded Wheels

CUTTING-OFF and slotting are now real production jobs and the Norton Resinoid Cut-off Wheel is a real production tool. In many plants where careful records are kept this wheel shows the lowest cost per cut. It also reduces the amount of stock lost in machining and finishes the cut so well that in many cases subsequent machining is not necessary.

For many wet cutting operations and for jobs where a minimum of burr is desired there are also Norton rubber bonded cut-off wheels. Norton engineers are available to study your cut-off jobs and recommend the correct wheels.

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh
Hartford Cleveland Hamilton, Ont. London Paris
Wesseling, Germany Corsico, Italy

W-708

NORTON ABRASIVES

Subject: The importance of new methods in rod making

Because of its high operating speed, a continuous rod mill requires an extremely flexible method of control to produce rods of accurate section, sound structure and good surface.

Bethlehem fully recognizes this need for flexible control and has introduced new methods to obtain it.

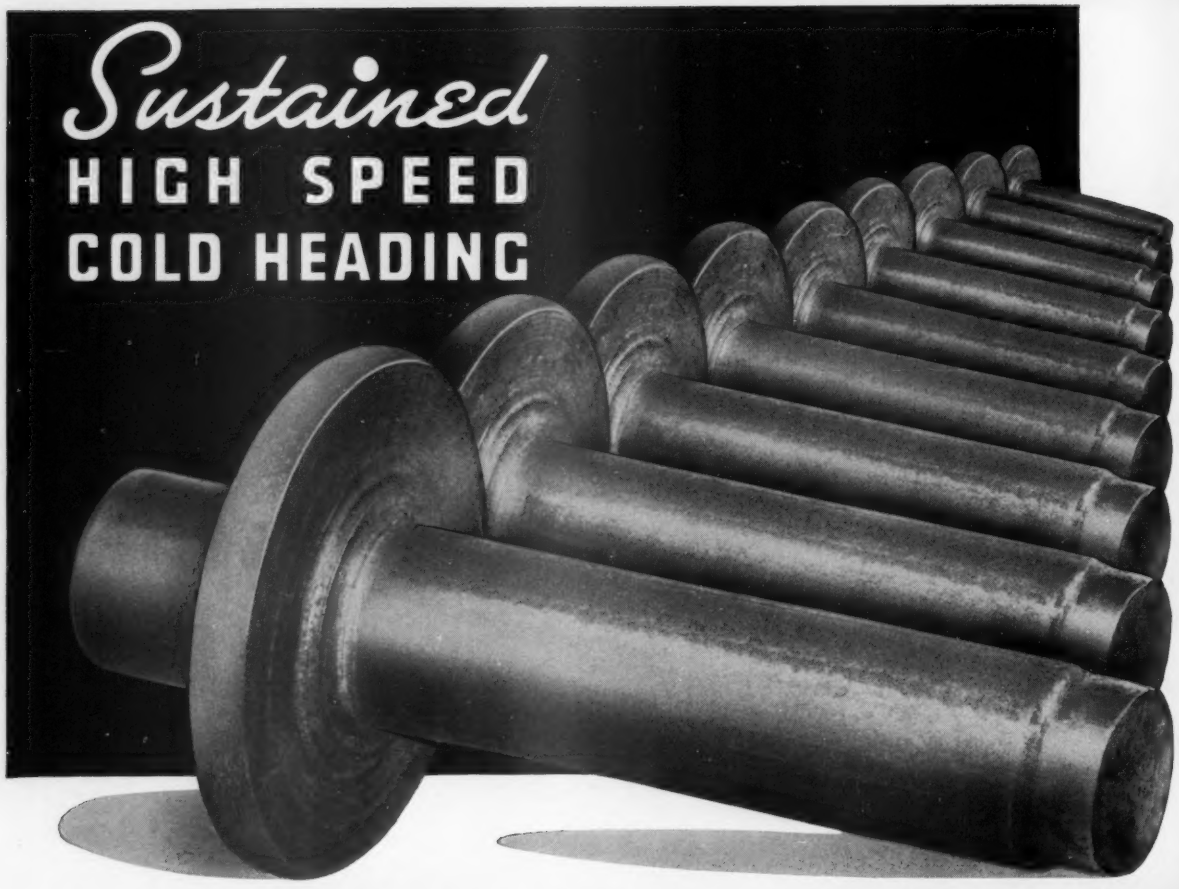
Multiple-motor drive—In older continuous rod mills, all of the stands operated in tandem from a fixed gear train and single-motor drive. Delicate speed adjustments between stands (to compensate for inevitable roll-wear) are impossible with this set-up. The new Bethlehem mill has 8 separate driving motors, the speed of which can be adjusted independently to prevent stretching or overfilling of rods when roll-wear changes gripping power of the rolls.

Looping stands—The two "looping stands" in Bethlehem's new rod mill act as speed compensators. Located at the end of the intermediate roll train, they reverse the direction of the rods twice, in the form of two U-bends or "loops," before feeding the rods into the finishing stands. These "loops" are free to shorten or lengthen. They absorb slight differentials in speed without damaging the rods by stretching or overfilling.

Pressure-film bearings—Rod-mill bearings function at tremendous speed, and, without proper precaution are apt to wear and cause an error in rod-section. Bethlehem's new pressure-film bearings cannot wear because there is no metal-to-metal contact. An oil-film of constant thickness is maintained under pressure between the bearing surfaces. The bearings "float."

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY



Needs Pittsburgh's smooth-flowing
DEPENDABLY UNIFORM WIRE!

Reaching the high production level of modern cold heading equipment is one thing . . . *sustaining* it is another. Precision control within new close tolerances makes the job even more difficult. Abreast of today's high speed demands, Pittsburgh Cold Heading Wire overcomes even the most stubborn difficulties through *dependable* uniformity and *consistent* flawlessness. *One* organization control, from ore to final inspection, results in unvarying structure, surface, composition, temper, and gauge . . . *your* assurance of sustained, trouble-free production. Try *Pittsburgh* for a new conception of Cold Heading Wire perfection.

Pittsburgh

PITTSBURGH STEEL COMPANY
1641 GRANT BUILDING · PITTSBURGH, PA.
New York Detroit Chicago Cleveland Houston Los Angeles

WIRE & WIRE RODS
A COMPLETE LINE FOR ALL FABRICATING NEEDS

There's a big difference in Carbide Dies

Vascoloy RAMET

TANTALUM-TUNGSTEN CARBIDE

WIRE DIES COST MUCH LESS IN THE LONG RUN

The Only Independent

Fully Protected by U. S. and Foreign Patents

VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS

Pittsburgh, Pa. Detroit, Mich. Hartford, Conn. Jersey City, N. J.

In Canada: Carbide Tool & Die Company, Ltd., Hamilton, Ont.

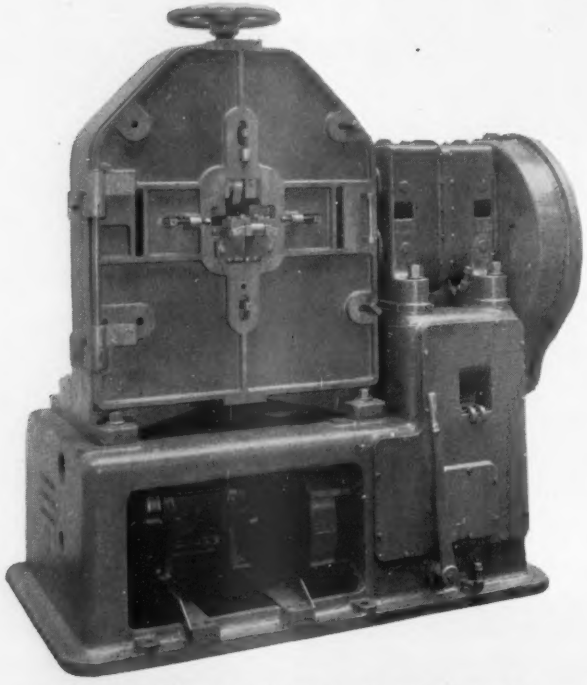
COP-R-DRAW TUF-DRAW FER-O-DRAW

PATENTED POWER DRIVEN "TURKS HEADS"

Are Something New—

THE FASTEST AND MOST ECONOMICAL METHOD OF FORMING SPECIAL SHAPES OF WIRE AND FOR EMBOSSING DESIGNS ON WIRE

THIS machine combines the functions of a wire drawing machine for pulling and for bundling the wire, but instead of the conventional type dies through which the wire is usually drawn it provides power driven rolls for reducing the stock.



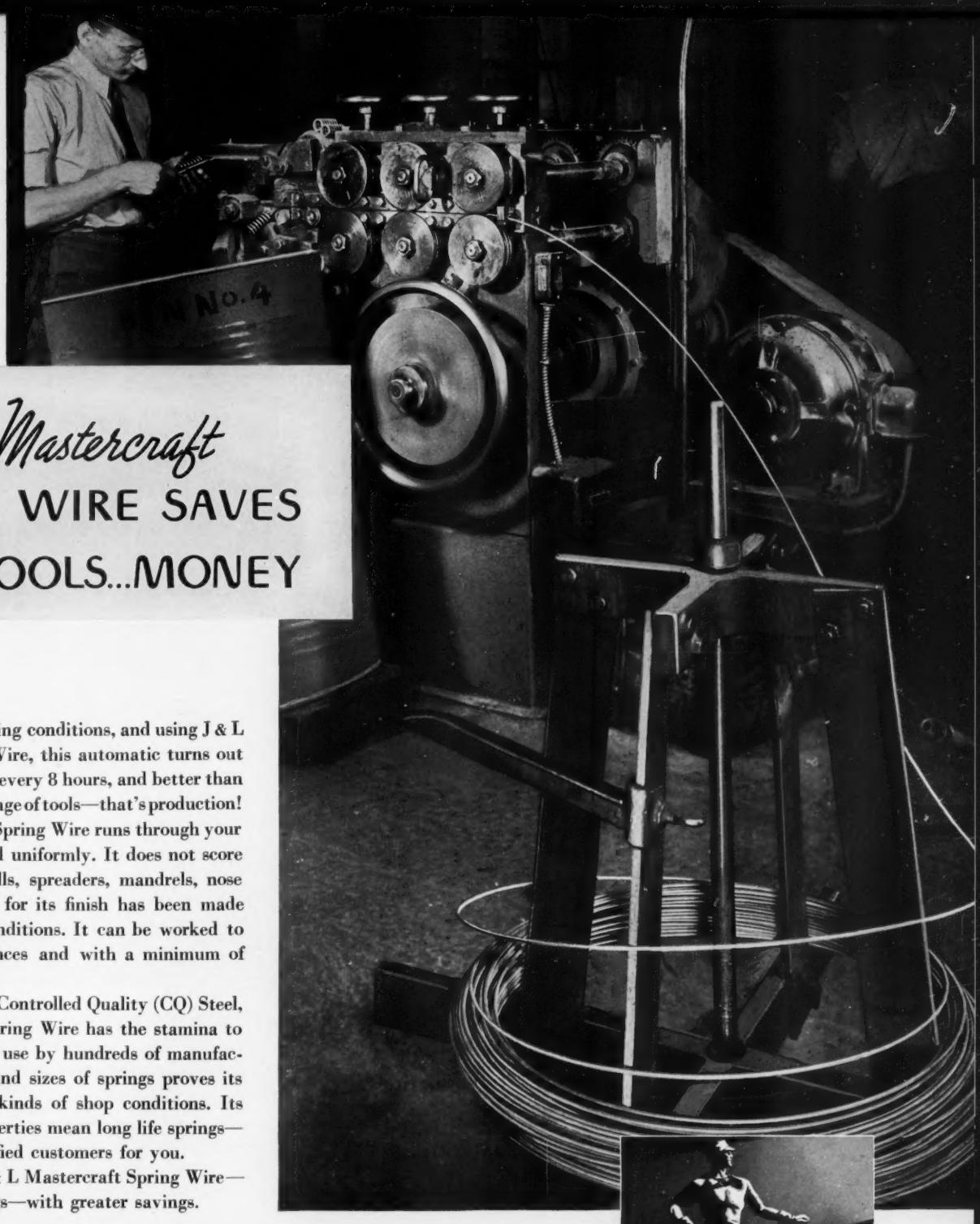
THIS type may have rolls formed for special shapes or rolls with designs engraved on them.

THE POWER DRIVEN PLAIN TYPE
(PATENTED)

WE ALSO FURNISH THE UNIVERSAL TYPE WHICH IS USED TO CONVERT ROUND WIRE TO RECTANGULAR SECTIONS

Write for Detailed Information

STANDARD MACHINERY CO.
PROVIDENCE, R. I.



J&L *Mastercraft* SPRING WIRE SAVES TIME...TOOLS...MONEY

Under routine operating conditions, and using J & L Mastercraft Spring Wire, this automatic turns out 12,000 clutch springs every 8 hours, and better than 300,000 without a change of tools—that's production!

J & L Mastercraft Spring Wire runs through your automatics easily and uniformly. It does not score your wire guides, rolls, spreaders, mandrels, nose pieces or other tools, for its finish has been made to suit your shop conditions. It can be worked to the closest of tolerances and with a minimum of machine adjustment.

Drawn from J & L Controlled Quality (CQ) Steel, J & L Mastercraft Spring Wire has the stamina to do a job for you. Its use by hundreds of manufacturers for all types and sizes of springs proves its reliability under all kinds of shop conditions. Its fatigue-resisting properties mean long life springs—and completely satisfied customers for you.

Specify and use J & L Mastercraft Spring Wire—and get better springs—with greater savings.

J & L—PILOTS THE COURSE OF CONTROLLED QUALITY IN STEEL

J&L STEEL

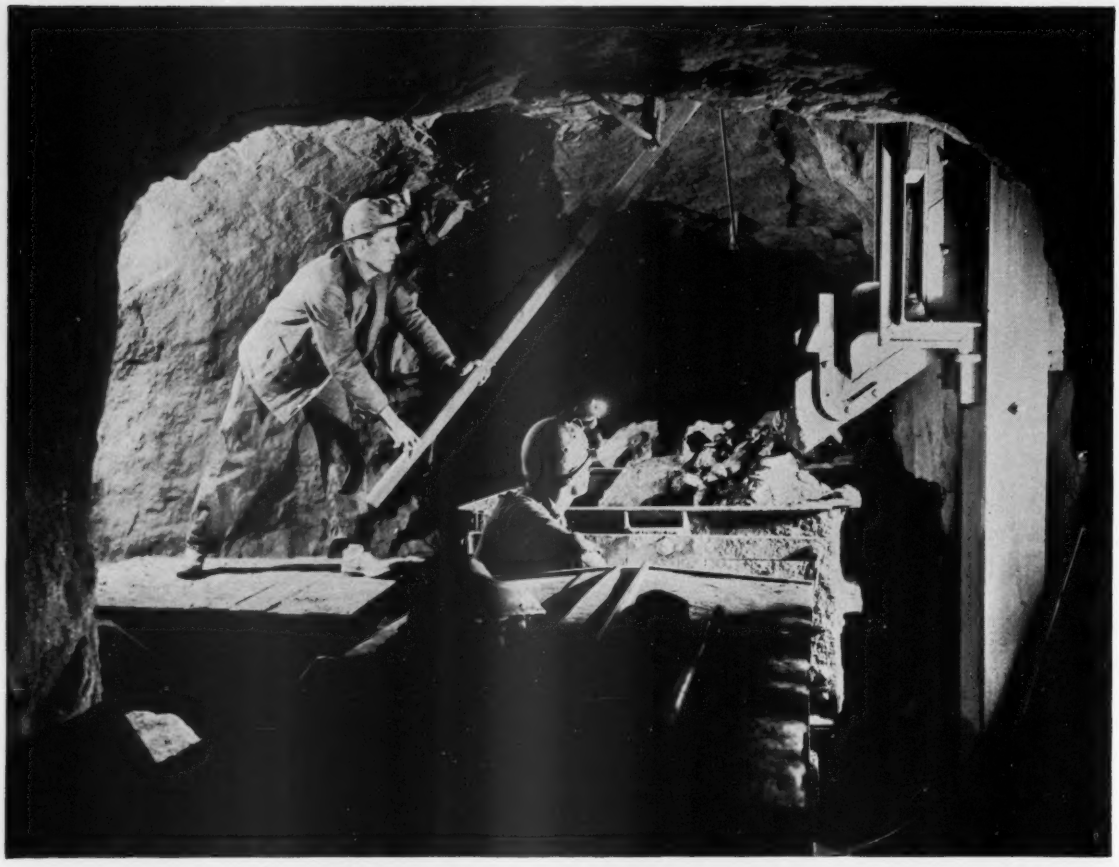
JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

J & L—PARTNER IN PROGRESS TO AMERICAN INDUSTRY

FROM ORE TO METAL

The Story of St. Joe Electro-Thermic Zinc—Number 5 of a Series



LOADING THE ORE TRAINS

From every underground ore chute in the Balmat mine of the St. Joseph Lead Company the broken rock is drawn off into the ore cars. Each train of about ten 3-ton cars is drawn by a 7-ton electric storage battery locomotive. These trains rumble through the long haulage drifts that are cut in the solid rock below the stopes, for a mile more or less, and dump the ore into the underground ore pockets from which it is later drawn off into 8-ton capacity hoisting skips and hoisted 2,000 feet up the inclined shaft to the crushers on the surface.

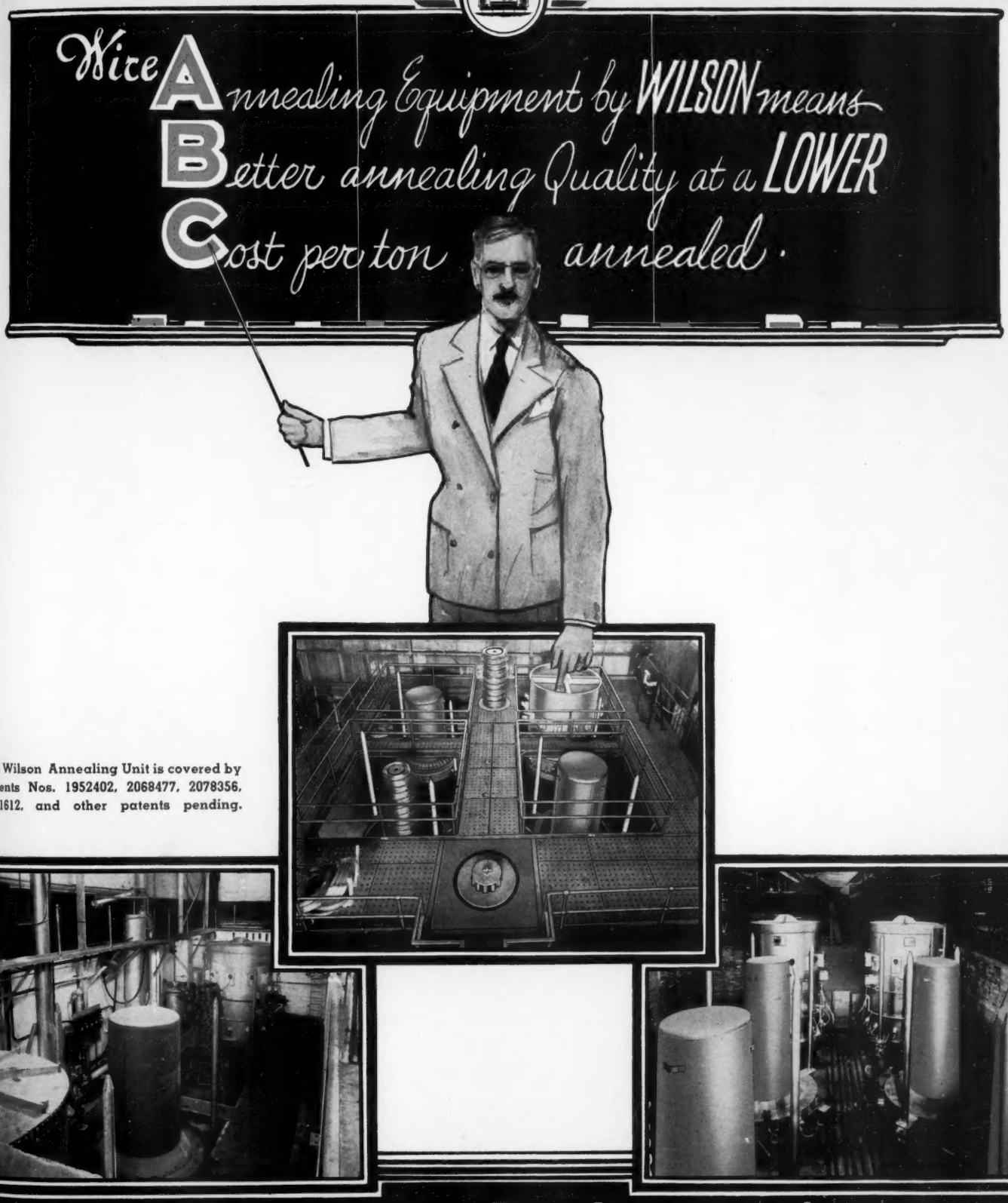
ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK

ELdorado 5-3200

PLANT AND LABORATORY, JOSEPHTOWN, BEAVER COUNTY, PENNSYLVANIA

Here is the A, B, C of WIRE Annealing



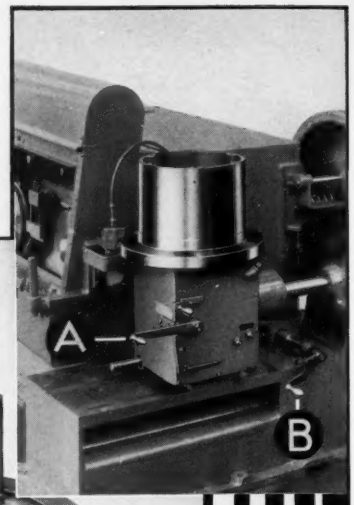
The Wilson Annealing Unit is covered by Patents Nos. 1952402, 2068477, 2078356, 2081612, and other patents pending.

An Exclusive Development of

LEE WILSON ENGINEERING CO.

1370 Blount Street • Cleveland, Ohio

WIRE DRAWING MACHINES



FOUNDED WATERBURY FARREL 1851

by WATERBURY-FARREL

WITH WIRE BLOCKS WHICH *rotate in either direction*

Upright Cone Continuous Machines with provision for quickly changing the rotation and position of block.
Two conveniently located removable handles do the trick in jig time—

A — changes direction of rotation
B — shifts position of block - - -

The machines are available with blocks of various diameters or with spooling devices. Our wire drawing machinery is described in Catalog W.

• WIRE AND ROD MACHINERY • COLD HEADING MACHINERY, ETC. •

WATERBURY FARREL
FOUNDRY & MACHINE COMPANY
WATERBURY • CONNECTICUT • U•S•A

CHICAGO CLEVELAND NEWARK, N. J.

— ANNOUNCEMENT —
— OF THE SPECIAL ISSUE OF —

WIRE *for* ..... JANUARY 1940
AND WIRE PRODUCTS

SPECIAL BECAUSE:——————

The discussions on technical papers at the annual meeting of the WIRE ASSOCIATION will be published in their entirety in the regular January issue of WIRE and WIRE PRODUCTS •

The directors of the WIRE ASSOCIATION have approved this plan to provide these discussions to all subscribers without extra expenditure ——————•

TO OUR ADVERTISERS:——————

The advertising value of this special arrangement to be followed in the January issue of WIRE and WIRE PRODUCTS is obvious ——•

•——Standard rate card will apply to this issue——•

Closing date December 20th, 1939

:—RESERVE YOUR SPACE AT ONCE—:

SEYMOUR

NICKEL SILVER

AND

PHOSPHOR BRONZE

For Important Springs

SPRINGS perform such important functions these days that they should be "designed into" the product rather than merely specified as routine. The kind of service the product must give, the treatment it will receive, conditions of operation, duration of non-stop operation—these and many more facts should be obtained before springs are decided upon.

In an earlier day this was not so important. The high-sounding, but generally understood, slogan, caveat emptor, was a part of most sales. Today even relatively unimportant merchandise must carry a money-back guarantee or at least the understanding that the manufacturer will not be too far behind the product if it bogs down in service!

So, every one making springs, or concerned with their sale and use, should find it a help to study the two Seymour alloys described below—alloys which have long been effective sidetrackers of design trouble.

NICKEL SILVER—**An alloy of copper, nickel and zinc which has these useful characteristics:**

A silvery white color that matches nickel, chromium or silver plating.

Takes chromium plating direct without pre-plating,

Capable of various degrees of hardness, from dead soft to spring temper,

In its easily controlled ductile stages, it is a superb material for stamping, drawing and spinning,

Resists corrosion in the extreme,

When leaded, it cuts freely.

PHOSPHOR BRONZE — **An alloy of copper, tin and phosphorus. Has the following outstanding qualities:**

Highly corrosion resistant,

Can be rolled or drawn to a lively resiliency,

Withstands almost endless "fatigue" cycles without serious loss of resiliency,

Extremely tough and resistant to friction and abrasion,

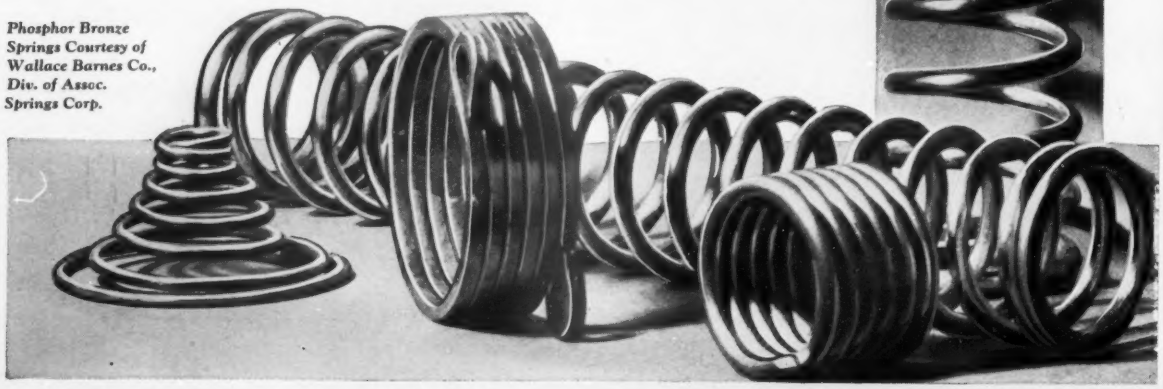
Practically indifferent to thermal change,

Offers no fire risk when struck or from "arcing" when electrically charged,

Alloys with lead for free cutting.

Complete technical information and test samples on request.

THE SEYMOUR MANUFACTURING CO., 62 Franklin St., Seymour, Conn.

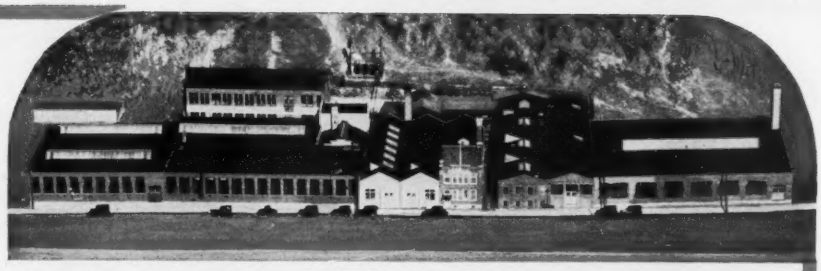


Phosphor Bronze Springs Courtesy of Wallace Barnes Co., Div. of Assoc. Springs Corp.

HUDCO

SPECIALIZES

WINCO



HUDSON WIRE CO. PLANT AT OSSINING, N. Y.

HUDCO AT OSSINING PRODUCES FINE WIRES IN ALL METALS.

FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver, 10%, 18%, and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire.

Cadmium, Nickel Silver, (10%, 18%, 30%); Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

"HUDCO" SPECIALLY PROCESSED COPPER WIRE FOR ENAMELLING PURPOSES IS DRAWN FROM SELECTED COPPER, INSURING THE MAXIMUM CONDUCTIVITY. THIS SELECTION PLUS OUR LONG EXPERIENCE AND UNEXCELLED PLANT FACILITIES INSURE OUR CUSTOMER BETTER WIRE AT LOWER COST.

WRITE TODAY FOR SAMPLES AND PRICES —

HUDSON WIRE COMPANY
OSSINING, N. Y.

ESTAB. 1902 SUCCESSORS - ROYLE AND AKIN

WINCO AT WINSTED, CONN. PRODUCES LEAKPROOF ENAMELLED WIRE AND OTHER WINCO ENAMELLED AND COVERED WIRES.

WRITE FOR SAMPLES AND PRICES —

WINSTED DIVISION
HUDSON WIRE COMPANY
WINSTED CONNECTICUT

There's no better time than right now to put

VAUGHN

MOTOBLOX and MOTOBLOC SPEED, FLEXIBILITY and DURABILITY TO WORK FOR YOU!

NOW... when orders are piling up ... when *production* is your biggest single problem, don't lose sight of the fact that *faster handling* is the key to better profits from this better business. Faster handling that you simply can't wring out of obsolescent wire-drawing machinery, be your methods advanced as they may! The times and your business demand the ultra-modern speed and flexibility only *Vaughn* Wire Drawing Machinery can provide . . . and for the long pull, you can't afford less than Vaughn durability and economy of maintenance. A Vaughn representative will discuss the whole situation with you at any time.

THE VAUGHN MACHINERY COMPANY · CUYAHOGA FALLS, OHIO

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 14 DECEMBER, 1939 No. 12

Designated as

Official Publication By The Wire Association

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Factors Governing the Arc Welding Behavior of Mild Steel Wire ..... By J. C. Joublanc 697

A progress report of the experimental research on this subject presented at The Wire Association Convention at Chicago, October, 1939. Further research will be conducted and comments and criticisms are desired by the author.

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The purpose and intent of the Non-Ferrous Committee is to collect information on the application of gas to the Non-Ferrous industry. This year's activity has been concentrated on specific application of gas to atmospheres used in the heat treatment of copper and copper alloys.

Production Is Preparedness ..... By Col. James H. Burns 703

In modern warfare, military supply rests upon the individual manufacturing plant. Today the industrial plant is as essential to the national defense as the fighting forces. Pertinent production data is presented here by the author.

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—ASSOCIATE EDITORS—

Kenneth B. Lewis, Consulting Wire Mill Engineer
W. H. Spowers, Jr., Consultant on Galvanizing
Lancaster, Allwine & Rommel, Consultants on Patent Information
European Correspondent
Paul Fidrmuc

Richard E. Brown, General Manager
R. S. Spengel, Business Manager

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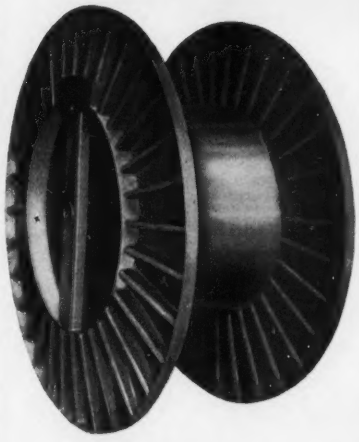
FOR REEL ECONOMY



STEVENS
LOW-TARE
STEEL SHIPPING REELS

AND

STEVENS FLANGED STEEL DRUMS

LOW-WEIGHT
PLUS
LONG LIFE

MADE IN IPCEA AND SPECIAL SIZES

COMPLETE DATA & PRICES UPON REQUEST

THE STEVENS METAL PRODUCTS CO.
NILES, OHIO

SPLIT GAUGES IN DECIMAL SIZES

(Originally Washburn & Moen Gauge, now Am. Steel & Wire Gauge)

7/0	—	.490	6	—	.192	18	—	.0475	30	—	.0140
	¼	.483		¼	.188		¼	.0459		¼	.0138
	½	.476		½	.185		½	.0443		½	.0136
	¾	.469		¾	.181		¾	.0426		¾	.0134
6/0	—	.4615	7	—	.177	19	—	.0410	31	—	.0132
	¼	.454		¼	.173		¼	.0394		¼	.0131
	½	.446		½	.170		½	.0379		½	.0130
	¾	.438		¾	.166		¾	.0363		¾	.0129
5/0	—	.4305	8	—	.162	20	—	.0348	32	—	.0128
	¼	.421		¼	.159		¼	.0340		¼	.0126
	½	.412		½	.155		½	.0332		½	.0123
	¾	.403		¾	.152		¾	.0325		¾	.0121
4/0	—	.3938	9	—	.1483	21	—	.0317	33	—	.0118
	¼	.386		¼	.145		¼	.0309		¼	.0115
	½	.378		½	.142		½	.0301		½	.0111
	¾	.370		¾	.138		¾	.0294		¾	.0108
3/0	—	.3625	10	—	.135	22	—	.0286	34	—	.0104
	¼	.355		¼	.131		¼	.0279		¼	.0102
	½	.347		½	.128		½	.0272		½	.0100
	¾	.339		¾	.124		¾	.0265		¾	.0097
2/0	—	.331	11	—	.1205	23	—	.0258	35	—	.0095
	¼	.325		¼	.117		¼	.0251		¼	.0094
	½	.319		½	.113		½	.0244		½	.0093
	¾	.313		¾	.109		¾	.0237		¾	.0091
1/0	—	.3065	12	—	.1055	24	—	.0230	36	—	.0090
	¼	.301		¼	.102		¼	.0224		¼	.0089
	½	.295		½	.099		½	.0217		½	.0087
	¾	.289		¾	.095		¾	.0211		¾	.0086
1	—	.283	13	—	.0915	25	—	.0204	37	—	.0085
	¼	.278		¼	.089		¼	.0198		¼	.0084
	½	.273		½	.086		½	.0193		½	.0083
	¾	.268		¾	.083		¾	.0187		¾	.0081
2	—	.2625	14	—	.080	26	—	.0181	38	—	.0080
	¼	.258		¼	.078		¼	.0179		¼	.0079
	½	.253		½	.076		½	.0177		½	.0078
	¾	.248		¾	.074		¾	.0175		¾	.0076
3	—	.2437	15	—	.072	27	—	.0173			
	¼	.239		¼	.070		¼	.0170			
	½	.235		½	.067		½	.0168			
	¾	.230		¾	.065		¾	.0165			
4	—	.2253	16	—	.0625	28	—	.0162			
	¼	.221		¼	.060		¼	.0159			
	½	.216		½	.058		½	.0156			
	¾	.212		¾	.056		¾	.0153			
5	—	.207	17	—	.054	29	—	.0150			
	¼	.203		¼	.052		¼	.0148			
	½	.200		½	.051		½	.0145			
	¾	.196		¾	.0491		¾	.0143			

WIRE DRAWING DIES

•

TUBE DRAWING DIES

•

EXTRUSION AND SPECIAL SHAPE DIES

•

NAIL DIES

COLD HEADING DIES

•

MANDRELS

•

GUIDES

•

SPRING FORMING TOOLS

•

WEAR RESISTANT PARTS

The above table is reprinted by request as a data sheet in a size between our wall chart and pocket card.

FIRTH-STERLING STEEL COMPANY

McKEESPORT, PENNA.

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 14 DECEMBER, 1939 No. 12

The Wire Mill Department at the Works of British Insulated Cables Limited, Prescot, Lancashire, England

A brief description of the plant and wire mill processes of one of the largest producers of insulated wire and cables in Great Britain. ✦ ✦ ✦ ✦

THE Wire Mill at Prescot was originally laid down to manufacture the conductor wires required in the Company's cable business. Its development during the past 40 years has been such that in addition to the Company's own requirements it now manufactures, for sale, copper and aluminum rods, wires, strips, sections and sheets; copper alloy wires and strips; Copperweld brand wires and solder and fuse wires in a wide range of types and sizes.

✦ ✦ ✦

THE mill does not handle any other than high-conductivity copper and it draws its supplies of this from the refinery of British Copper Refiners Limited.

✦ ✦ ✦

THE Rolling Mill plant includes three electrically driven rod mills each complete with ancillary plant.

Copper Rod Mill Rolls 1000 Tons A Week

ONE of the rod mills has an output 1000 tons per week and is exclusively devoted to the production of copper rod from standard H.C. wire bars of approximately 250 lbs. weight. These bars are heated in a pulverized coal fired furnace through which they are pushed in two parallel rows by electrically operated rams. As each cold bar is introduced a heated one falls out at the delivery end, where an operator controls the ram by push button.

✦ ✦ ✦

THE heated bar falls on to a live roll conveyor which carries it to the three-high roughing rolls. There are six passes in all and a bar raising device is used to facilitate the return on the 2nd and 4th passes.

Fig. 1. Bright Annealing Furnaces—Wire Mill Prescot Works. ✦

✦ ✦ ✦

THE bar is led mechanically from the roughing rolls to the three-high intermediate rolls where it is further reduced through three passes being handled on one side by catchers and on the other by repeaters.

✦ ✦ ✦

THE finishing train is a series of alternate two high rolls arranged in line. Catcher again handle the rod on the oval

side and it is returned mechanically on the square side. Sloping channels running down from floor level are provided to accommodate the slack which accumulates between passes.

✦ ✦ ✦

DURING the whole process which takes about a minute, the rod has been rolled in various shapes, first in squares and afterwards in squares and ovals alternately. The last pass of the finishing train reduces it to a circular section, usually ¼" diameter and it is led through a pipe to one of a set of three semi-automatic winders which, after winding, drop the coil onto a plate type conveyor and thence to a chain conveyor along which it travels to the pickling shop. The various rolls in this mill are all rope-driven from a 1226 H.P. motor.

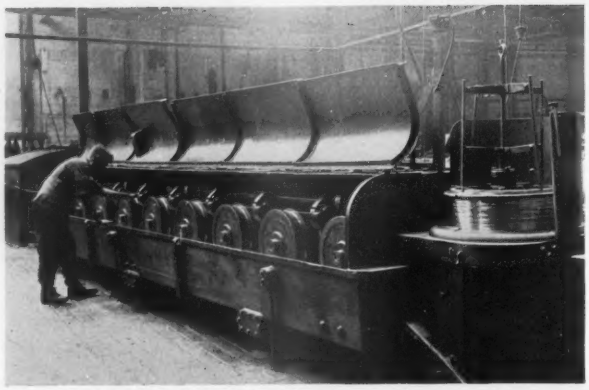


Fig. 2. Tandem Wire Drawing Machines. ✦ ✦ ✦

✦ ✦ ✦

Pickling

PICKLING is necessary to remove the rolling mill scale and the process consists in immersing the coils of black rod by means of a telpher in pickling tanks, the liquid in which is continuously pumped through a battery of recovery vats. In these the copper content is deposited electrically as cathode plates for subsequent use in the casting of alloys, while the reconditioned acid is returned to the system.

✦ ✦ ✦

Aluminum Rod Mill

OF the other mills, one is used exclusively for aluminum as the use of one mill for both copper and aluminum would result in inclusions of copper or copper oxide in the surface of the aluminum. The process of rolling is in general principle the same as for copper but the standard bar is a different shape and the rolling temperature is considerably lower than that for copper.

✦ ✦ ✦

Rod Mill for Heavier Copper And Cadmium Copper

THE third rod mill is used for the rolling of heavier bars in the production of Copper and Cadmium Copper trolley and contact wires, as well as copper for heavy strips. This mill has recently been remodelled and the floor extended to enable copper bars up to 1000 lbs. weight to be handled. The roughing rolls are provided with a tilting table in front and a fixed table at the back of the stand, both fitted with live conveyor rolls, all controlled by switches, with interlocking features to ensure that the tilting table is in correct position to receive the bar on the return pass.

✦ ✦ ✦

FROM the pickling vats the coils of rod are taken by the telpher to a washing tank, where jets of water at high pressure thoroughly cleanse them of all traces of acid, and then on to the heavy wire drawing shop.

✦ ✦ ✦

Wire Drawing Machines

HERE the equipment included nineteen large tandem wire drawing machines driven by 150-200 H.P. motors and capable of reducing the ¼" rod through a maximum of eleven dies to finished size, with a lower limit of .044" diameter. The dies are made from a composition of tungsten carbide or other similar material.

✦ ✦ ✦

THESE mahines are of the horizontal spindle type and are totally enclosed while running. The draw drums are driven at appro-

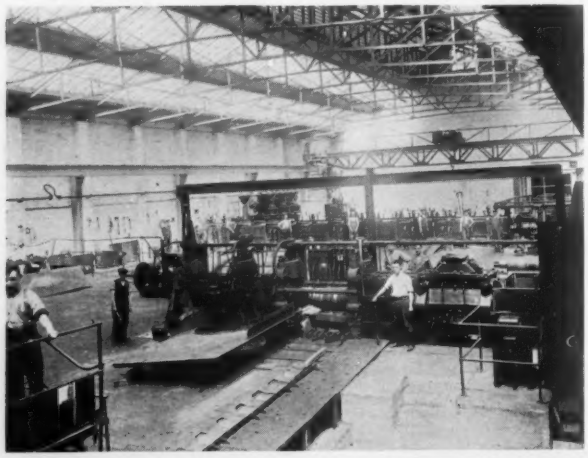


Fig. 3. The Rod Mill. ✦ ✦ ✦ ✦ ✦

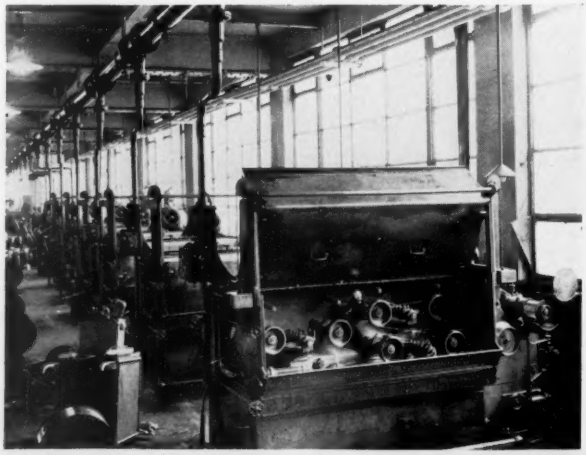


Fig. 4. Fine Wire Drawing Machines. ✦ ✦ ✦

priate speeds by gearing from a back shaft. Push button control is used and a trunk system for copious lubrication of the dies is installed.

✦ ✦ ✦

Welding

IN accordance with modern practice the leading end of each rod is butt welded to the tail end of the preceding rod, for which purpose resistance welders of the Company's manufacture are installed close to the input end of the tandems.

✦ ✦ ✦

Coil Handling Apparatus

A RESERVOIR block recently developed and patented by the Company enables finished coils of wire to be removed from the take off block without stopping the machine itself. Where this type of block is fitted the process becomes truly continuous and if it were not for wear on the dies the machines could run indefinitely.

✦ ✦ ✦

Cone Type Machines

A GROUP of medium-heavy cone type machines handle some of the output from the tandems and reduce it to smaller sizes by drawing anything up to 15 holes through composition and diamond dies, the latter being used at the finishing end.

✦ ✦ ✦

IN these machines the draw drums are in the form of stepped cones with the dies arranged in groups, the wire being taken round the smallest step first, through a die, round the smallest step on another cone and so on, finishing with the largest. A great saving in length and therefore in floor space is thus obtained.

✦ ✦ ✦

Fine Wire Machines

MEDIUM-FINE and fine wires of finished sizes ranging from .018″ to .001″ diameter are handled in a separate shop laid out specially for their production.

✦ ✦ ✦

HERE the machines are of the cone type, using diamond dies exclusively. The output of each machine of which there are 80, is taken off on spools. A continuous conveyor takes these, when full, to the packing benches at one end of the shop, and brings supplies of fresh spools to the machines.

✦ ✦ ✦

Dies for International Gauges

AS wires are drawn at Prescot to British, American and Continental sizes as well as special diameters for telephone and telegraph conductors a very large stock of dies has to be maintained and the mill has a plant for the drilling and mounting of composition pellets and the re-sizing and polishing of both composition and diamond dies. Both automatic and hand operation are used.

Annealing

ANNEALING is of course an important process in the manufacture of copper wire and two methods are in regular use. The larger wires for cable conductors are annealed in oil or gas fired water sealed muffle furnaces of the Bates and Peard type. In these furnaces, which were first developed and made by the British Insulated Company, the wire is carried on a continuous chain conveyor through a water seal into the muffle and out at the other end through another seal. To prevent the entry of air a small head of steam is kept on the furnace. This method which has been in use for many years has more recently been supplemented by the installation of a number of electric annealing furnaces of the batch type.

✦ ✦ ✦

IN the largest of these, which has a container capacity of 4 tons of copper wire the elements are mounted round the inside of the portable furnace bell. The copper is loaded into a carrier over which the furnace bell is placed, a water seal being provided round the base and a neutral atmosphere maintained by filling the interior with an inert gas. Temperature is controlled by thermostat. At the end of the annealing period the furnace bell is transferred to a second container and the first is cooled off.

(*Please turn to Page 717*)

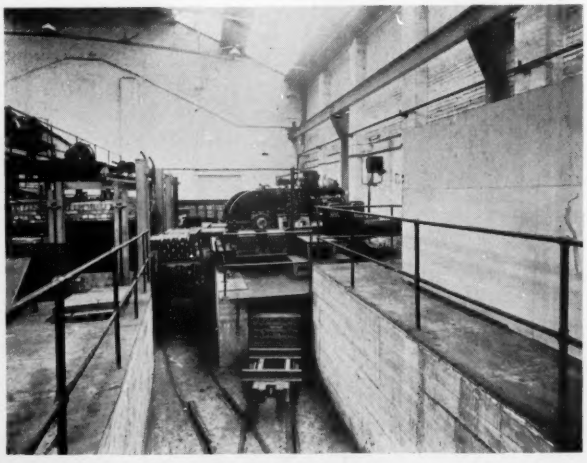


Fig. 5. Wire Bars Entering Re-Heating Furnace. ✦ ✦

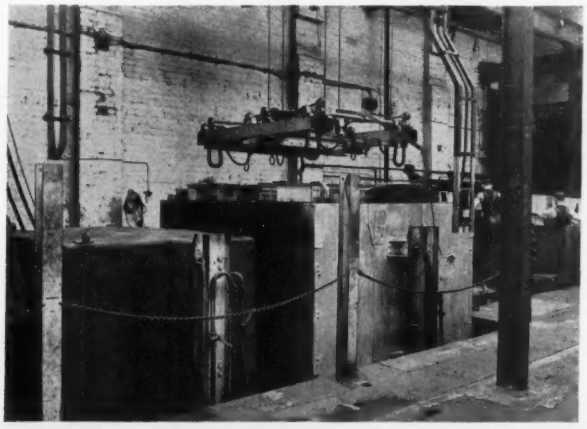


Fig. 6. Electric Annealing Furnace. ✦ ✦ ✦

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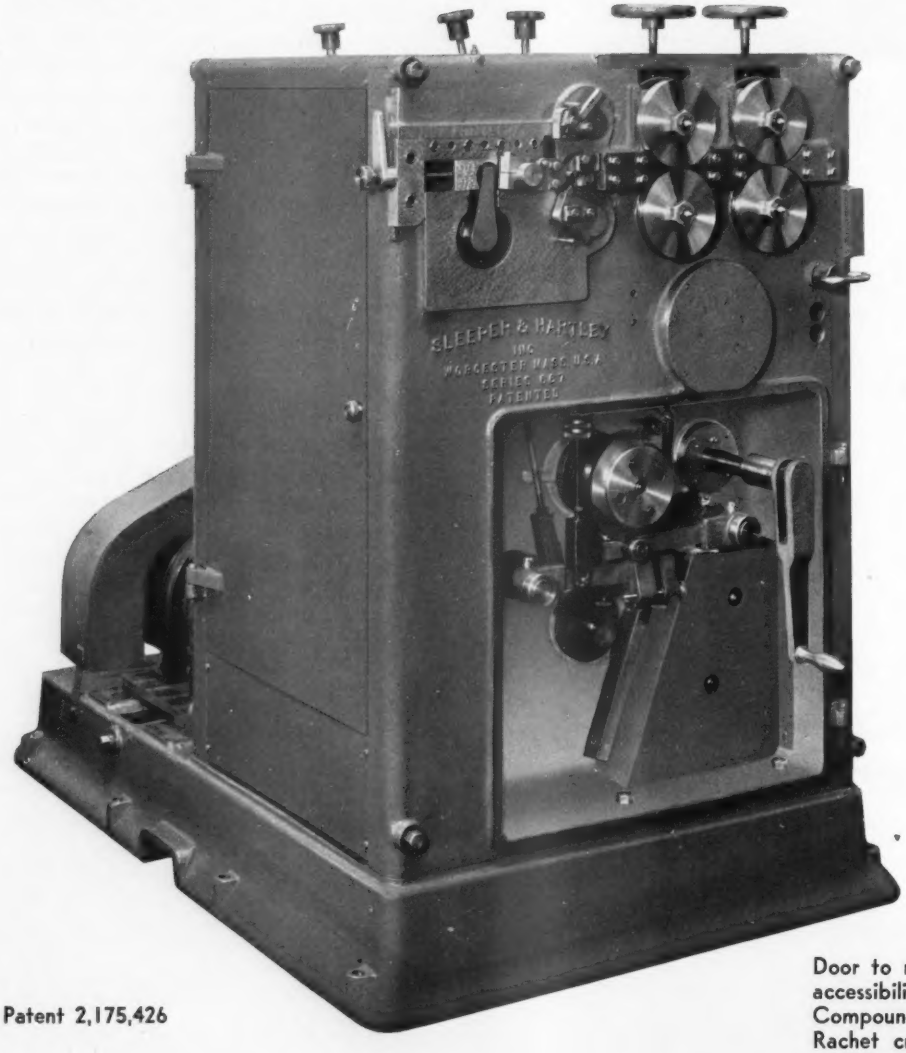
64" Model

Wire Range:
No. 20 (.035") to No. 8¾ (.152")



Patent 2,175,426

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- New Features

Door to recess removed to show accessibility to Cam Controls, Compound Blocks and Cams. Rachet crank handle, removable, used for set-up purposes only.

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Factors Governing the Arc Welding Behavior of Mild Steel Wire

By J. C. Joublanc,
Technical Director, Electrode Division,
Harnischfeger Corporation, Milwaukee, Wis.

A progress report of the experimental research on this subject presented at The Wire Association Convention at Chicago, October, 1939. Further research will be conducted and comments and criticisms are desired by the author. ✦

WHEN Mr. Westphal asked me to prepare a paper for presentation before this convention, we did not realize the many aspects of mild steel wire as they relate to electric arc welding. As we began accumulating data for this paper I realized that there was much which had already been said and in an attempt to introduce new data we came across certain phenomena which, though important, would be meaningless unless thoroughly investigated. For instance: we found it desirable to study the effects of minute quantities of some of the more active alloying elements and for this purpose it was necessary to obtain a great number of steel samples of special analyses which obviously would have to come from a number of sources. It was the time involved in accumulating these samples which has made it impossible to present the results of this investigation in its entirety. We will attempt, however, to record our observation of some of the phenomena which will be elaborated upon as the investigation progresses.

✦ ✦ ✦

THIS investigation is being conducted primarily for the purpose of accumulating such data as are necessary to give a definite meaning to the very indefinite term **"Welding Quality"** and once we know most of the factors governing this characteristic, it will, no doubt, be possible to effect considerable improvements. In fact, our preliminary studies indicate that many of the electrode properties which are obtained by means of corrective coatings may be incorporated in the base wire itself. This would have decided advantages since thinner coatings could be used resulting in higher deposit efficiencies, for example. The investigation has been divided into several phases which are:

1. **The basic source of the wire; that is, type of scrap used, whether heavy or light. The literature is replete with data pointing to influence of the scrap charge, on some metal properties.**
2. **The chemical composition which will be divided into studies of**
   a. **the ordinary "chemistry", that is, the carbon, manganese, sulphur, phosphorus, and silicon content, with special emphasis on the Carbon-Manganese ratio.**
   b. **and the more obscure elements which we have reason to believe exert a marked influence on welding quality.**
3. **Wire Drawing.**

✦ ✦ ✦

THERE seems to be a decided lack of agreement regarding the influence of the degree of cold drawing on welding behavior. Those who claim that hard drawing promotes good weldability seem to be in the majority. However, extensive tests made under conditions capable of giving precise data contradict this claim. We had several wire manufacturers supply us with samples of 3/16" wire which had been drawn down in 1, 2, 3, and 4 passes, that is, annealing between passes as the wire was drawn in more than one pass. We found that the softer samples welded with much less arc disturbance than the harder ones. Of course, if the wire is to be coated by extrusion there is a decided advantage to the use of hard drawn wire in that there is less distortion produced during cutting. It is our opinion that wire finished in two passes after annealing is ideal from the standpoint of both cutting of the wire into suitable lengths, and welding behavior.

✦ ✦ ✦

Behavior of Bare Wire in the Arc-Metal System

HOWEVER limited our knowledge of the physics of the electric arc, one thing we do know and that is its extreme susceptibility to magnetic and atmospheric conditions. We know, for instance, that there may be wide variation in the arc behavior of different lots of wire of as nearly identical structure and composition as it is commercially possible to produce. We have ample evidence that substances present in the arc atmosphere, presumably in an ionized state, induce extreme wildness, or maximum stability depending upon the ease with which these substances are capable of ionizing. When we speak of stability the thing we have in mind most of all is the width of the arc flares. In an unstable condition, the arc will fan out more than an inch on either side of the electrode naturally carrying with it large globules of molten metal. If the wire is of inherently good welding quality, or if stabilizing substances are introduced into the arc, the arc flares will not extend much beyond a quarter-inch in any direction away from the arc. Further studies

may reveal that some element, such as titanium, which we know possesses arc stabilizing properties, could be added to the molten metal from which wire is ultimately to be produced and with the same arc stabilizing effect as is the case when the element, or a compound of the element is introduced into the arc atmosphere.

✦ ✦ ✦

ONE substance which all investigators agree on as a source of spatter is sulphur. This is undoubtedly due to the low dissociation constant of iron and manganese sulphides and the volatility of the sulphur liberated.

✦ ✦ ✦

PHOSPHORUS and copper have long been considered electrode "poisons", as well. In the case of phosphorus, we are inclined to believe that the bad reputation it has, was derived from its association with sulphur in steels in which both these elements may be present, such as Bessemer or Acid open hearth steels. As a proof of this contention, we have obtained excellent results with electrodes, the base metal of which was Inland Steel Company's Hi-Steel containing up to .15 Phosphorus. Also, we have been successful in increasing the tensile strength of weld metal by adding phosphorus, in the form of Ferro-Phosphorus, through the coating, without any appreciable decrease in ductility.

✦ ✦ ✦

WE are unable to trace the source of the opinion that the presence of copper is detrimental to the welding behavior of mild steel wire, but some wire manufacturers take unnecessary pains to eliminate it. As a matter of fact, the low carbon base wire which we consider to possess the best welding properties, contains 1% of copper. This element, too, has been added to weld metal through the coating with excellent results.

✦ ✦ ✦

THE most interesting characteristic, and perhaps the one which, more than anything else, effects the welding quality of mild steel wire, is the surface tension of the molten metal as it is transferred across the arc and its effect on the shape of the deposited bead, as well as its influence on the melting rate of the electrode. If the composition of the wire is such that the molten metal will have a high surface tension, the metal will be transferred across the arc in large globules. The higher the surface tension of the metal, the larger will be the globule. It has been observed that as these globules of liquid metal grow in size there is an increase in spatter due to an occasional explosion of the globule. It is conceivable that that particular globule may contain iron oxide inclusions which, reacting with carbon, produce carbon monoxide which expands with sufficient rapidity to cause the explosion. It is our opinion that when more data is accumulated regarding this particular phenomena, it will be possible, by the addition of small amounts of elements known to affect surface tension, to properly control this characteristic. Professor Doan found that by applying a thin coating of a suspension antimony in sodium silicate there was a marked decrease in the surface tension of the molten metal resulting in its rapid transfer across the arc in the form of small globules. This, as is to be expected, was attended by a marked increase in arc stability. Our own observations confirm Prof. Doan's and we found that we could increase the deposit efficiency of bare wire by altering its surface tension.

✦ ✦ ✦

ANOTHER important factor in the welding behavior of mild steel wire is the carbon-manganese ratio. Ordinarily the lower the carbon content of mild steel wire the lower will be the manganese. This is not always desirable as the tensile properties of the deposited metal will be low and it may indicate improper deoxidation. We have found that for best welding performance as well as maximum soundness and weld properties, the carbon should be sufficiently low, as low as .06% to .10%, to insure proper ductility and the manganese content over .50 for proper deoxidation and to increase tensile strength. Of course, this would mean departing from the standard furnace practice or the use of low carbon Ferro-manganese. One concern from which we purchase wire uses the following method: The carbon is brought down as low as possible and the bath partly deoxidized with aluminum just before the addition of high carbon Ferro-manganese. This permits of greater manganese recovery which means that Ferro-manganese can be added in smaller quantities which, obviously, causes only slight increase in carbon.

✦ ✦ ✦

AS has been said in the beginning of this talk, the paper is not intended to be a complete report of all our findings, but rather a Progress Report and an outline of the course we will pursue in furthering this study. We hope that when we do report this investigation in its entirety we will have contributed something worthwhile to the welding industry at large and to the wire phase of that industry in particular.

The Discussions at The Wire Association Meetings Will Be Published in Detail in the January, 1940 Issue of Wire and Wire Products.

✦ These Discussions — In Connection With the Published ✦
✦ Papers Will Contain Information of Great Value To All ✦
✦ Wire Production Men — Be Sure To Secure A Copy. ✦

Annual Convention of The Wire Association

Watkins Receives Medal Award for 1939 ✦ ✦ ✦ Braley Delivers the First John Mordica Memorial Lecture ✦ ✦ ✦ Details of the Technical Sessions ✦ ✦ ✦ Plans for 1940 Meeting. ✦ ✦

THE Annual Convention of the Wire Association opened at the Congress Hotel, Chicago, Illinois, on Monday, October 23rd with a Special Director's Meeting at 10:30 A. M., which was followed by a Luncheon attended by the Officers and Directors, the authors of the papers and the Program Committee. At the Directors' Meeting the minutes of the previous meeting were read and approved and both the semi-annual and annual reports of the Treasurer were presented, discussed and approved.

✦ ✦ ✦

The Medal Award

THE Annual Wire Association Medal Award for 1939 presented **"for the outstanding paper on wire manufacture or fabrication written by a member of the Wire Association during the year"** was awarded to Stanley P. Watkins, Manager, Sales Development, Rustless Iron and Steel Corporation, Baltimore, Maryland for his paper "The Manufacture and Use of Stainless Steel Wire". No honorable mentions were awarded this year.

✦ ✦ ✦

THE Medal Award was announced at the Annual Meeting of the Wire Association held on Wednesday, October 25th and the winner was advised that a bronze plaque will be forwarded to him from the Gorham Company of New York within the next thirty days.

✦ ✦ ✦

IN connection with the Wire Association Award the Secretary of the Wire Association was instructed by the Board of Directors to see that publicity was given in WIRE and WIRE PRODUCTS to the effect that a paper, to be eligible for the Medal Award, need not necessarily be prepared for presentation at the Annual Meeting but that the Medal would be awarded for any paper written by a member and published in WIRE AND WIRE PRODUCTS during the year preceding the Medal Award if the paper warranted such action. If such a paper is selected it will then be presented at the Annual Meeting as the Medal Award paper.

STANLEY P. WATKINS
Manager, Sales Development
Rustless Iron and Steel Corporation, Baltimore, Md.
Born in Russellville, Alabama, in 1904, educated in Alabama public schools, Birmingham-Souther College and Carnegie Institute of Technology; Associate Metallurgist at U. S. Naval Laboratory, Munhall, Pennsylvania, 1927 to 1929; Metallurgist Wrought Iron Research Association, Pittsburgh, Pennsylvania, 1930 to 1931; 1931 to present time, Rustless Iron and Steel Corporation, Baltimore Maryland, Metallurgist, Sales Engineer and Manager Sales Development. Member The Wire Association.

✦ ✦ ✦

Publication of Proceedings and Technical Discussions

THE detailed stenographic minutes of the technical discussions and proceedings will be published in full in the January issue of WIRE AND WIRE PRODUCTS together with a list of registered attendance to facilitate the identification of those participating in the discussions.

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IN addition, the Mordica Memorial Lecture which was presented by **Dr. S. A. Braley, Ph.D.,** Fellow, Mellon Institute of Industrial Research, Chief Metallurgical Field Engineer, Rod & Wire Division, Pittsburgh Steel Company, Pittsburgh, Pennsylvania, entitled **"A Correlation of the Factors and Effects of Cold Drawing of Wire Rods"** will be published in the same issue of WIRE AND WIRE PRODUCTS, as well as the complete proceedings of the Acid Disposal Symposium held in connection with the Convention.

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Appointment of Program Committee for 1940 Meeting

CONSIDERATION was given to the program for the 1940 meeting and Mr. John Moritz, Superintendent of the Keystone Steel and Wire Company, Peoria, Illinois was appointed Chairman of the Steel Division and Mr. Sidney Rolle, Assistant Manager of the Scomet Engineering Company, New York, New York was appointed Chairman of the Non-Ferrous Division. Further appointments of committee members will be announced in the January issue of WIRE AND WIRE PRODUCTS.

Fine Wire Association Affiliation Proposed

A PROPOSAL was presented before the Board of Directors to form an affiliation of some kind with the Fine Wire Association and as a result of the ensuing discussion the Secretary of the Wire Association was instructed to formulate the proposal to submit to the Directors of the Wire Association which, after their approval, could in turn be submitted to the Fine Wire Association for action.

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The 1940 Meeting

THE 1940 Convention will be held at Cleveland, Ohio in Association with the National Metal Congress as in past years and the Headquarters of the Wire Association will be at the Hotel Carter.

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The Technical Sessions

OUTSTANDING features of this year's technical sessions were original researches presented by our Association speakers. **J. C. Joublanc,** Technical Director, Electrode Division, Harnischfeger Corporation, Milwaukee, Wisconsin presented a progress report of experimental work conducted to determine the type of steel best adapted for high grade welding rods. His recommendation was that hard drawn wire be used and he stated that Swedish iron gives a satisfactory, stable bare wire.

✦ ✦ ✦

W. G. SEE of the Submerged Combustion Company, Hammond, Indiana presented the idea of pickling wire and rods in coil form by the use of a submerged unit, stating that the average pickling time could be reduced from 30 to 40 per cent by this process. In his presentation he stated that it was possible to pickle one ton of steel rods at a fuel cost of 5 cents per ton using 1000 B.t.u. gas at 50 cents per 1000 cubic feet.

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R. R. TATNALL, Metallurgical Engineer, Wickwire Spencer Steel Company, Worcester, Mass., presented three factors for calculating production methods on strand units and pointed out the fact that wire speeds and number of strands have definite relations to other characteristics of the equipment and that of the three factors used in production calculations wire size enters only through a physical relation to weight which is entirely independent of equipment.

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J. S. LITTLE, Manufacturing Engineer, Western Electric Company, Kearny, New Jersey discussed a method for economically manufacturing paper insulated wire for telephone exchange area cable.

✦ ✦ ✦

IN brazing copper, it was brought out by **L. L. Wyman,** Research Engineer, General Electric Company, Schenectady, New York, that clearances should be kept small in the interests of high strength and that the loading of the outside of the joint with excess solder is but a waste of metal.

✦ ✦ ✦

IN the paper by **S. P. Watkins,** Manager, Sales Development, Rustless Iron & Steel Corporation, Baltimore, Maryland, he pointed out that stainless steels have solved many tough corrosion problems and that they are the present time the lowest cost materials available having a wide range of resistance to industrial conditions.

✦ ✦ ✦

DR. C. L. MANTELL, Technical Director, Wilbur B. Driver Company, Newark, New Jersey stated that the production of electric resistance wire with satisfactory life performance at high temperatures depends upon sound, clean, gas-free workable ingots of controlled grain size.

(*Please turn to Page 719*)

Trends In Application of Atmospheres To Heat Treatment of Copper and Copper Alloys

By Ralph D. Hawkins,

The Bridgeport Gas Light Company, Bridgeport, Conn.
Chairman, Non-Ferrous Metals Committee,
The American Gas Association

The purpose and intent of the Non-Ferrous Committee is to collect information on the application of gas to the Non-Ferrous industry. This year's activity has been concentrated on specific application of gas to atmospheres used in the heat treatment of copper and copper alloys. While most of the personnel of the committee was chosen from the New England territory, in order to facilitate periodic committee meetings, we have attempted to broaden the scope of data collected by means of questionnaire. ✦ ✦ ✦ ✦ ✦

Historical Background

PRIOR to 1932, with one exception, we can say there was almost no equipment in use in the copper industry in which it was possible to control the atmosphere or the surface condition of the product within more than a limited degree.

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THE one exception noted consisted of those installations where steam was used as an atmosphere and furnaces largely built by Kenworthy.

✦ ✦ ✦

WHILE it was possible to bright anneal in these furnaces, their use was largely limited to the wire division of the industry, mainly because the nature of the application made it necessary to introduce the work to and remove it from the furnace through a water seal, which prohibited its use on products where water staining was a factor. The remaining equipment in use in the brass and copper industry at that time was designed to limit, as far as possible, the formation of heavy oxides, mainly with the intent to decrease pickling costs rather than to attempt to eliminate them.

✦ ✦ ✦

IN the meantime, interest in the control of atmospheres and the production of clean metal had been proceeding very rapidly in the steel industry. As the possibilities of atmosphere control became apparent, it was natural that equipment should be developed which would make possible the production of suitable atmospheres in the heat treatment of steel at a relatively low cost. As these developments progressed to a point where they were successful in their application to steel, it was natural that the application of the same atmospheres and production equipment should be made in the copper industry. The development of bright annealing equipment in the Non-Ferrous Industry, therefore, really dates back six or seven years and is a direct outgrowth of work originally done on steel.

This Report of the Non-Ferrous Metal Committee is published by permission of the American Gas Association.

RALPH D. HAWKINS

Ralph D. Hawkins, Industrial Engineer, The Bridgeport Gas Light Company has for ten years devoted all his energies to the solution of fueling problems principally for non-ferrous metal producers and processors. Mr. Hawkins was graduated from the School of Metallurgy Ohio State University, 1923 and is a member of the American Society for Metals, Connecticut Non-Ferrous Foundrymen's Association, New England Gas Association and the American Gas Association. He has been Chairman of the Non-Ferrous Committee in each of the two latter organizations mentioned above for the past two years. Previous to his work at the Bridgeport Gas Light Company he was in charge of the Industrial Division of the Worcester Gas Light Company

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Early Controlled Atmosphere Applications

IN view of the fact that the controlled atmosphere in non-ferrous furnaces started with atmospheres and atmosphere producing equipment which had already been developed, it was natural that the first installations for bright annealing copper and copper alloys should be indirectly heated.

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THESE furnaces fell into three categories consisting of fuel fired muffle furnaces, fuel fired radiant tube furnaces, and electrically heated furnaces. The atmosphere, in all cases, was generated by means of an extraneous gas generator utilizing any of the common fuel gases for producing the atmosphere.

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WHILE the individual manufacturers expressed their own individuality in details of design in practically all cases these generators consisted of a combustion chamber, in which a closely

regulated mixture of fuel gas and air was burned, a primary cooler consisting of either a spray washer or an indirect heat exchanger, and, generally, a drying unit utilizing either absorption by means of activated alumina or silica-gel, or electric refrigeration.

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IN almost all of the early equipment, the work was slow coiled in a dry atmosphere and was discharged from the furnace with a clean bright surface, free of water stains. The atmosphere consisted of a slightly reducing gas containing from one and one-half per cent to three per cent of carbon monoxide and a slightly larger per cent of hydrogen. The moisture content was held to a dewpoint of thirty to forty-five degrees.

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IT is understood that the above applies to copper, cupro nickel and other copper alloys which were extremely low in zinc content. Most of the brasses were susceptible to clean annealing under these conditions, but could not be obtained with a bright surface.

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AT this time, a considerable amount of time and money was spent in conjunction with the American Gas Association's recent research program in the development of an atmosphere which would make it possible to bright anneal the brasses. As a result of this development, the so-called Methanal process was evolved, which did make it possible to bright anneal brass under favorable conditions. Several installations were made, but the process has never proved commercially successful, because of its cost and because of certain inherent difficulties in control, developed under production conditions. At this time no process is available which can produce other than a clean surface on brass products.

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ONE of the early difficulties encountered in the Non-Ferrous Industry, which had not been a factor in the steel industry, was the result of Sulphur content in certain of the manufactured gas territories. Copper is extremely active in the presence of hydrogen sulphide, and it was found to be necessary to remove any hydrogen sulphide developed in the gas generator itself. While the gas companies purify the gas to the extent of removing practically all of the hydrogen sulphide, there remains a certain amount of residual sulphur in the form of organic sulphides of varying concentration depending upon the manufacturing practices of the local utility. It was discovered that the total sulphur content under eight grains per hundred cubic feet was not so much a factor as the manner in which the sulphur was combined. Certain of the organic sulphides seem to burn very readily to sulphur dioxide, which is either removed in the scrubber or the primary condenser, and which gives no difficulty. Others of the sulphides seem to combine more readily with hydrogen to form hydrogen sulphide which made it necessary, in certain localities, to install oxide towers in addition to the conditioning equipment already listed.

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ANOTHER means of limiting difficulties of sulphur was found to be in the operation of the generator itself. It developed that sulphur trouble was largely absent when the carbon monoxide content of the atmosphere gas was held at a point not higher than one and one-half to two per cent. It also was discovered that sulphur difficulties were aggrevated considerably when the temperature in the cracking unit was allowed to drop below 2000 degrees. In general, we can say that the art of preparing atmospheres suitable for bright annealing of copper and the equipment necessary for its production have been developed today to a point where atmosphere troubles have been almost eliminated.

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Recent Developments

AS the brass and copper industry became more familiar with the use of controlled atmospheres, and as the equipment manufacturers learned more concerning the industry's problems, and the characteristics of copper and its alloys, it became apparent that equipment for bright annealing could be considerably simplified. The early furnaces were expensive in initial cost and, particularly the muffle furnaces, were limited in size. The operating cost on this type of equipment was also somewhat higher because the furnace efficiency itself was lower and because the heat generated in forming the atmosphere was wasted.

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THE cost of preparing the atmosphere led to investigations in two different lines. In one case the products of combustion used for heating the muffle itself were removed from the combustion chamber, purfied, dried, and introduced back into the muffle as an atmosphere. This application was satisfactory from the standpoint of the surface condition of the product but did not eliminate the disadvantage that a muffle was still necessary and that its use limited the size of the equipment.

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AT about the same time recognition was given to the fact that water vapor in the atmosphere is not detrimental unless the temperature drops to a fairly low point, as is the case where work is slow cooled. There were occasions where it was not necessary to slow cool the work, but where the product could be quenched in a direct water spray. Several furnaces of this type were installed utilizing direct fired burners, the only departure from conventional furnace design being that the furnaces were constructed with a gas tight casing, with provisions for maintaining a positive furnace pressure at all times. The burners were set to maintain reducing conditions, the flue gases containing approximately one and one-half per cent carbon monoxide.

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IN order to eliminate the infiltration of air during periods of low turn down, it is necessary, in some cases, to supply a larger volume of atmosphere than is actually required to hold the furnace at temperature. In cases of this kind, steam supplies a ready source of volume

(*Please turn to Page 720*)

Production Is Preparedness

By Col. James H. Burns,
Executive to the Assistant Secretary of War
Colonel, Ordnance Department, U. S. Army

In modern warfare, military supply rests upon the individual manufacturing plant. Today the industrial plant is as essential to the national defense as the fighting forces. Pertinent production data is presented here by the author. ✦ ✦ ✦

THE brutal truth about war is that by its very nature it frequently requires the application of the force necessary to kill and demoralize the people and to devastate the property of the enemy to the end that his ability to resist is destroyed. This has always been true in the past and will continue to be true in the future. The only thing changing about war is the force available. Unfortunately, this force keeps pace with the progress of civilization. We simply convert to war uses all advances in scientific and engineering lines and in productive capacity.

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AS a consequence, today we must be prepared to go to war with the most efficient killing and devastating machines mankind ever has devised and in quantities corresponding to the mass-production capacity of the present age. In other words, present-day war is simply mass killing and destruction by means of machines resulting from mass production. These machines or weapons are the products of industry, and industry in turn is made up of the individual manufacturers. So it seems proper to analyze what the individual manufacturer would be called upon to do in time of war.

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THE national-defense strength of the country is essentially dependent upon the strength of two fronts—the fighting front and the home front. In part, these fronts are separate and distinct; in part, they are so closely associated as to be practically one. While the fighting front, in general, must be given first priority, the home front cannot be neglected for it is the reservoir which furnishes the man power and the supply power on which the fighting front depends. The collapse of one front would be as fatal as the collapse of the other.

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ORDINARILY in time of peace, practically the entire industrial effort of the United States is directed to meeting the demands of the home front, as the men and the materials utilized by the Army and Navy are more or less negligible. Even in time of war, the total industrial requirements of the home front will always greatly exceed the similar requirements of the fighting front. As the war load is assumed, certain of the home-front peace-time requirements will decrease, especially in those lines which can be classified as non-essential. The war effect on exports and imports would correspondingly change the industrial requirements of the home front. But in any event, most of the individual manufacturers will be called upon to produce the same things in time of war that they produce in time of peace; many will manufacture some home-front products and some fighting-front products; and some will concentrate mostly on fighting-front products.

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WHAT the individual manufacturer would be called upon to do for the home front is essentially for industry itself to determine. It is primarily the duty of national-defense officials to indicate what the manufacturer must do for the fighting front.

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WAR would not only impose on industry the colossal requirements of the fighting front but it would inevitably impose new conditions and new laws and regulations. In war, increased regimentation of the country is inescapable, but I take it that most of us sincerely desire to keep that increase to the very minimum. The more orderly the approach to the problem and the better the plan for solving it, the less will be the increase in regimentation.

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AS a result of World War experience, Congress passed the National Defense Act in 1920. That act sets up an agency under the Secretary of War and the Assistant Secretary of War to make orderly plans for the industrial mobilization of the country in time of war. Although the Navy is not mentioned in the act, it is perfectly apparent that the Navy is not of secondary importance to the Army

This is an address delivered before the Chamber of Commerce of the United States at its twenty-seventh annual meeting, Washington, D. C., May 2, 1939. Reprinted from "Army Ordnance" by permission.

in the field of national defense, and that its needs must be at least as fully provided for as those of the Army. Consequently, the Army and Navy always have acted as a team in carrying out this mandate of Congress, and they have been working on these plans for some eighteen years. I will try to sketch the main steps.

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INDUSTRIAL mobilization simply means putting industry to work on coordinated and efficient basis to produce all those things which the country really needs.

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THE first all-important question to be settled, so far as the fighting front is concerned, is: What is required? The answer must be based upon the assumption of the amount of fighting power needed on the part of our sea forces, our land forces and our air forces, not only at the start of war, but also by time intervals thereafter. It can be only an assumption, for no one can forsee who the enemy will be. The assumption as to the initial strength required has been made either directly or indirectly through acts of Congress. Assumptions as to augmentations in strength required thereafter have been made in large part by Army and Navy officials. In so far as the Army is concerned, they are substantially as follows:

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FOR our land forces, the Protective Mobilization Plan is based upon an initial strength of 400,000 men, made up of the Regular Army and the National Guard.

Within three months' time the strength is to be increased to 1,000,000 men and thereafter to be increased in accordance with the Army's program, which obviously must be geared to provide for the maximum effort.

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FOR our air forces, the initial strength is to be not more than 6000 airplanes, of which only some sixty per cent are to be combat planes. The strength thereafter is to conform with the Army's program.

IT is important to note that the assumption as to the strength required by our Army in the early months of a war provides for only a relatively small percentage of that available to each of the other major powers in the world. This is permissible and sound because of our favorable geographic location, our "nonaggression" military policy, and a navy second to none.

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BASED upon these assumptions as to strength and the known equipment and consumption factors, there have been calculated the number and types of airplanes, engines, and instruments; guns, ammunition, and fire control; trucks, shelters and clothing; gas masks, radios and telephones; medical equipment, etc., required at the start of war and by intervals thereafter. This task is of itself one of real magnitude, for in the Army alone we have seven supply branches to care for the various needs of the soldier, and their combined items number many hundreds. It is obvious that calculations must be made not only for the assumed plan but that provisions must be made for a quick shift to any other plan dictated by changed circumstances.

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ANOTHER essential and never-ending task in the establishment of the requirements program is the determination of the designs and specifications to be used. They must be changed constantly to keep pace with the progress of the world. Perhaps the lack of knowledge of our supply requirements at the time of the World War caused more confusion and waste than any other factor.

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THESE calculations produce the all-important shopping list, and the next step is to arrange for industry to produce the items listed at the required rate. This in turn requires information as to where the work can best be done, what arrangements are necessary to put individual plants to work and what can be done to eliminate, either wholly or in part, the inevitable bottle necks.

WITH the consent and assistance of industry, field representatives of the Army and Navy surveyed plants throughout the entire United States to determine which ones were of value for producing the needs of the fighting front and which products they were best qualified to make. Over 20,000 plants have been so surveyed. Based upon this information as to production and upon the requirements of the national-defense program, the Army and Navy Munitions Board, which is the joint agency controlling industrial mobilization, allocates the plants to the war load on the basis of agreed-upon priorities. At the present time, some 10,000 plants are so allocated. These plants, have accepted so-called schedules of production, which show what they are to produce by type, quantity and time. The allocations and schedules of production are revised every three years. In making the allocations it is to be noted that the needs of the home front always are considered and industrial capacity provided therefor. The magnitude of this task can be visualized from the size of the book recording the distribution of the war load—it is as large as a New York telephone directory. We have here at least a partial answer to the question as to what the individual manufacturers would be called upon to do in the event of war.

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THE surveys soon developed that it was not only necessary to provide for primary products but also for contributory items and raw materials. Among others special studies had to be made of the machine-tool problem, of the steel problem, the electrical-power problem and of certain raw materials—especially of those which are obtained in large part from foreign countries.

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AS a result, there is a special machine-tool committee and plan. The Army has been able to buy some special tools to correct the worst situations and hopes to be able to purchase increased quan-

tities. There is also a special steel plan. The President recently appointed a National Defense Power Committee to survey this field and make necessary recommendations. There are plans for critical and strategic materials.

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AS the effort proceeded to mobilize industry in an effective way, other weaknesses developed. As an example, it soon was apparent that it was necessary to give special training to selected officers so that they could help perfect the plans in time of peace and thus better assist industry in time of war. As a result, there was created the Army Industrial College which now trains some sixty Army and Navy officers each year and already has graduated over seven hundred officers.

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AS another example, contact with industry disclosed that we were asking plants to produce complicated and precise machines of war with which they had no experience. This brought forth the idea of educational orders. In this fiscal year such orders have been placed to the value of $2,000,000 and next year it is hoped that we will be able to place additional orders to the extent of $32,500,000. These orders are intended not only to educate the plant how to produce the item in question but also to provide a reasonable amount of equipment and detailed factory plans covering the full war production schedule.

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AS another example, it is quite evident that in the event of a maximum war effort, industry will have to produce more in spite of the fact that a large number of valuable production men will be called to the colors. This means that plans must be made to provide the necessary mechanics, skilled workmen, etc., to man industry. A special interdepartmental committee has been appointed by the President to study this problem and make recommendations.

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IN time of peace the Army buys through the method of competition. When time is not of the essence, this is believed to be the best method. But in time of emergency this method is not completely satisfactory. It is slow; it is not sufficiently elastic to cope with the changing conditions of the emergency, and it does not permit spreading the load. Therefore, in time of emergency we must be able

AMERICA'S INDUSTRIAL STRENGTH

The following, from the 1935 Census of Manufactures, is a list of industries which would be of strategic importance in war time in maintaining America's armed forces in the field and also in providing the necessities of the civilian population on the home front. In selecting only 44 of 280 major branches of industrial activity, the Committee on National Defense of the Chamber of Commerce of the United States, in its recent report, cited them as an indication of America's potential industrial strength in war.

Industry	Number of Establishments	Annual Value of Products
Agricultural implements, including tractors	241	$ 291,254,000
Aircraft and parts	79	45,347,000
Ammunition	13	26,308,000
Blast Furnaces	72	374,651,000
Boots and shoes, other than rubber	1,024	643,872,000
Boots and shoes, rubber	12	53,162,000
Bread and other bakery products	19,068	1,235,073,000
Butter	3,458	501,216,000
Canned and dried fruits and vegetables	2,744	649,644,000
Cars, electric and steam railroad	150	100,542,000
Cement	153	120,417,000
Condensed and evaporated milk	467	171,489,000
Cotton manufactures	1,223	1,030,768,000
Cranes and dredging, excavating and road-building machinery	128	62,860,000
Electrical machinery, apparatus, and supplies	1,393	960,430,000
Explosives	74	40,667,000
Fabricated textile products other than wearing apparel and house furnishings	788	147,605,000
Feeds, prepared, for animals	942	288,662,000
Firearms	22	13,027,000
Flour and other grain-mill products	2,193	853,219,000
Food preparations, miscellaneous	1,029	222,606,000
Foundries	1,251	250,460,000
Gloves and mittens of leather	224	28,131,000
Instruments and apparatus, professional and Scientific	283	68,344,000
Knit goods	1,852	606,726,000
Leather, tanned and finished	384	308,345,000
Locomotives	14	17,383,000
Machine shops	3,026	418,054,000
Machine tools	259	121,833,000
Meat packing	1,223	2,362,369,000
Men's and boys' clothing	2,981	615,065,000
Motorcycles, bicycles and parts	23	23,086,000
Motor vehicle bodies and parts	825	1,550,924,000
Motor vehicles not including motorcycles	121	2,391,090,000
Nonferrous metal alloys and products	1,098	393,227,000
Optical goods	100	33,600,000
Petroleum refining	395	1,838,622,000
Rubber tires and inner tubes	42	446,092,000
Smelting and refining, copper	20	348,257,000
Smelting and refining, lead	16	137,219,000
Steel works and rolling mills	396	1,931,318,000
Sugar production	169	498,655,000
Surgical appliances	307	61,764,000
Wool and hair manufactures	699	710,740,000

to purchase through negotiation, and the law provides this authority. However, when large-scale negotiation is resorted to and the Government negotiators are in many instances novices in the field in which they are working, it is evident that special contract forms and formulas must be provided which assure fair treatment both to the Government and to all the contractors and spur them on to more efficient effort. Such contract forms and formulas have been drawn up and are revised from time to time as conditions justify.

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ONE of the big questions in time of war is certain to be that of price control with all that it entails; such as salaries, wages, taxes, prices of materials and services, and profits. If we reduce profits to the vanishing point we force practically complete regimentation of industry. On the other hand, if we permit unreasonable prices and profits we likewise ruin the morale of the country. The Brookings Institution, at the request of the War Department, is now making a special study of this question.

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AS I stated at the start, industry must satisfy both the fighing front and the home front. There are bound to be many conflicts and overlaps between these two fronts, and there will have to be a special authority to settle them. Certain policies covering the entire national effort for both fronts will have to be planned and executed. These problems can best be handled by a superagency reporting to the President, and plans including appropriate legislation have been drawn up for such an agency.

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I HAVE sketched briefly how we propose to mobilize industry in the event of war. Much has been done and much remains to be done, even from the planning point of view. However, we must not think that we can open a valve and let munitions flow out immediately as water from a hydrant. Such is far from the truth. It does not conform to world experience. England has been practicing industrial mobilization for some three years and is apparently not yet satisfied with results. France has been doing likewise and is apparently even more dissatisfied. Both of these countries are increasing the regimentation of their industries and the end is not yet in sight. Germany and Italy have been practicing industrial mobilization for an even longer period under complete regimentation. They have both reduced the consumption of industrial materials of the home front to the minimum and have increased the work power of the home front to the maximum in order to build up stocks of fighting materials for the fighting front. Japan and Russia are doing likewise. They are all working under full steam.

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IF all these nations, spurred on by the threat of immediate war and immediate invasion, must spend three or four years to create necessary stocks of fighting materials and to mobilize their industries to continue the supply in the event of war, it is obvious that we would require many months to match them in supply strength. Time is the all-important factor, for the potential supply power of the United States is greater than of any other nation in the world.

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FORTUNATELY, the present military estimate of the situation does not require that we match the supply strength of any power. But it does require that we be able to implement fully the forces already indicated. Our efforts at industrial mobilization and our general experience disclose that we cannot convert potential production into actual production in a large way in complicated items in less than some twelve months. It will take the well-organized aircraft industry nearly a year to turn out the first airplanes under the new orders, and the contracts will not be completed for about twelve months thereafter. No better results can be expected for many of the ordnance items. Furthemore, we must allow the time necessary for the delivery of the produced munitions to the fighting front.

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IN closing, I want to emphasize that the fundamental rule of supply preparedness is that stocks plus production must equal requirements. The more we can rely upon production, the less the Government has to spend for stocks. In turn, production depends upon the output of the many individual plants making up American industry. The individual plant is therefore eventually the very foundation of preparedness.

The Discussions at The Wire Association Meetings
Will Be Published in Detail in the January, 1940
Issue of Wire and Wire Products.

✦ These Discussions — In Connection With the Published ✦
✦ Papers Will Contain Information of Great Value To All ✦
✦ Wire Production Men — Be Sure To Secure A Copy. ✦

Outstanding Personalities of the Wire Industry

Ralph K. Clifford, Vice President Of Operations, Continental Steel Company

RALPH K. CLIFFORD, since 1937, Works Manager, of the Kokomo Division of the Continental Steel Corporation, has been named Vice-President in Charge of Operations for all of the company's plants, at Kokomo and Indianapolis, Indiana, and Canton, Ohio. Announcement of the appointment, which is effective immediately, was made by **Mr. D. A. Williams,** President of the company.

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MR. CLIFFORD has been connected with the Continental organization for thirty-two years. He began his career in the steel industry in 1907 with the Kokomo Steel & Wire Company, which, in 1927, became a part of the Continental Steel Corporation. From 1907, until his graduation from the University of Michigan in 1914, Mr. Clifford worked in various departments of the Kokomo plant during school vacation periods.

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IN 1916, two years after his graduation, which time he spent teaching chemistry and physics in Michigan High Schools, Mr. Clifford became chief chemist of the Kokomo plant, later assuming the duties of chief metallurgist and chief inspector.

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HE was appointed assistant general superintendent of the Kokomo plant in 1923, and two years later was elevated to general superintendent. He became works manager of the Kokomo division in 1937.

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MR. CLIFFORD has been an active member of the Wire Association, and is now a past president of this organization. He is also a member of the executive committee of the Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers.

RALPH K. CLIFFORD
Vice President, Continental Steel Corp.
Past President, The Wire Association

F. J. Griffiths, Executive Vice President, Copperweld Steel Co.

THE appointment is announced of **Frederick J. Griffiths,** a pioneer in the development of alloy steels, as executive vice president of the Copperweld Steel Company in charge of the company's newly created steel division.

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MR. GRIFFITHS has been actively engaged in the alloy steel industry for a number of years. From 1913 to 1926 he was associated with the Central Steel Company in positions ranging from general superintendent to president and general manager. From 1926 to 1929, at which time Central was merged with the Republic Steel Corporation, he was chairman of the board of the Central Alloy Steel Corporation. From 1929 to 1931 he was president of Republic Research Corporation and a member of the board of the Republic Steel Corporation. Subsequently he was president of the Timken Steel & Tube Company and a member of the board of Timken Roller Bearing Company. For the past three years he has been president of the Griffiths-Bowman Engineering Company. Mr. Griffiths at present holds directorships in Eaton Manufacturing Company, Cleveland, The Cleveland Graphite Bronze Company, Cleveland, O., Inland Investors, Inc., Cleveland, O., and The Aetna-Standard Engineering Company, Youngstown, Ohio.

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R. E. Hough, General Manager, Johnstown Plant, Bethlehem Steel Co.

THE appointment is announced of **Ralph E. Hough** as general manager of its Cambria plant at Johnstown, Pa. Mr. Hough, who has been assistant general manager of the Cambria plant since 1936, takes the place that was recently made vacant by the death of C. R. Ellicott.

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THE steel making experience of Cambria plant's new general manager dates back to 1905, when he went to work for the Lackawanna Steel Company at Lackawanna, N. Y., which was acquired by Bethlehem in 1922, and is now known as the Lackawanna plant. The year following its acquisition by Bethlehem, in 1923, Mr. Hough was made superintendent of the bar mills at Lackawanna. In January, 1928, he was transferred to Cambria plant as superintendent of the Gautier Mill, the position from which he was promoted to assistant general manager in 1936.

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H. G. Walter, President, Gerrard Co., Inc.

H. G. WALTER, formerly vice president, Gerrard Co., Inc., Chicago, maker of wire strapping machines, has been elected president. He has been with the Gerrard organization 13 years, serving first as secretary and then vice president. Adolf Larsen, general sales manager, has been elected vice president in charge of sales.

STATISTICS --- 3rd QUARTER --- 1939

PRODUCTION FOR SALE OF IRON AND STEEL PRODUCTS

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

Third Quarter - 1939 (period)

		Number of companies	Items	Annual Capacity Gross tons	Production for Sale—Gross Tons: Current Quarter: Total	Current Quarter: Per cent of capacity	Current Quarter: Shipments: Export	Current Quarter: Shipments: To members of the industry for conversion into further finished products	To Date (9 Months - 1939): Total	To Date: Per Cent of capacity	To Date: Shipments: Export	To Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	32	1	xxxxxxx	716,003	xxx	49,010	470,626	1,815,841	xxx	81,972	1,205,456
	Heavy structural shapes	8	2	4,796,800	561,057	46.8	29,082	-	1,494,270	41.5	67,544	xxxxxxx
	Steel piling	4	3	309,300	48,520	62.7	4,146	-	110,273	47.5	7,438	xxxxxxx
	Plates—Sheared and Universal	19	4	5,828,310	565,074	38.8	50,397	4,136	1,572,531	36.0	160,354	11,181
	Skelp	7	5	xxxxxxx	158,173	xxx	24,541	98,140	347,807	xxx	26,952	238,594
	Rails—Standard (over 60 lbs.)	4	6	3,395,300	164,556	19.4	1,202	-	796,224	31.3	7,695	xxxxxxx
	Light (60 lbs. and under)	6	7	418,500	17,508	16.7	1,028	-	51,398	16.4	14,276	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	105,000	5,670	21.6	1,070	-	19,783	25.1	2,437	xxxxxxx
	Splice bar and tie plates	14	9	1,290,550	63,875	19.8	1,056	-	300,955	31.1	3,739	xxxxxxx
	Bars—Merchant	35	10	xxxxxxx	763,286	xxx	35,069	76,040	2,029,214	xxx	75,126	204,784
	Concrete reinforcing—New billet	14	11	xxxxxxx	240,102	xxx	14,164	-	650,520	xxx	41,536	xxxxxxx
	Rerolling	19	12	xxxxxxx	40,835	xxx	1,545	-	115,298	xxx	6,081	xxxxxxx
	Cold finished—Carbon	18	13	xxxxxxx	124,003	xxx	2,055	-	339,661	xxx	4,395	xxxxxxx
	Alloy—Hot rolled	14	14	xxxxxxx	165,486	xxx	1,598	15,645	434,441	xxx	12,146	38,248
	Cold finished	14	15	xxxxxxx	13,914	xxx	42	-	39,210	xxx	169	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	17,364	xxx	381	-	44,913	xxx	725	xxxxxxx
	TOTAL BARS	53	17	11,570,970	1,364,990	47.2	54,854	91,685	3,653,257	42.1	140,176	243,032
	Tool steel bars (rolled and forged)	15	18	94,160	10,317	43.8	1,429	-	26,625	37.7	2,555	xxxxxxx
	Pipe and tube—B. W.	15	19	1,623,800	217,635	53.6	7,381	-	563,259	46.2	20,634	xxxxxxx
	L. W.	11	20	1,316,580	82,429	25.0	2,741	-	215,392	21.8	7,327	xxxxxxx
	Electric weld	4	21	615,000	78,538	51.1	1,596	-	160,357	34.8	5,151	xxxxxxx
	Seamless	15	22	2,968,900	398,662	53.7	23,815	-	981,461	44.1	57,038	xxxxxxx
	Conduit	6	23	153,670	15,244	39.7	461	-	42,778	37.1	1,307	xxxxxxx
	Mechanical Tubing	5	24	182,100	21,349	46.9	188	-	65,432	47.9	2,091	xxxxxxx
	Wire rods	19	25	xxxxxxx	174,492	xxx	5,079	55,536	452,846	xxx	18,719	147,721
	Wire—Drawn	38	26	1,970,195	297,731	60.4	12,909	2,114	813,289	55.0	41,026	8,925
	Nails and staples	19	27	1,080,760	160,588	59.4	6,490	-	429,342	53.0	18,497	xxxxxxx
	Barbed and twisted	16	28	428,075	45,791	42.8	13,134	-	145,929	45.5	33,682	xxxxxxx
	Woven wire fence	15	29	695,330	48,042	27.6	438	-	182,795	35.1	1,332	xxxxxxx
	Bale ties	11	30	110,680	17,347	62.7	11	-	41,566	50.1	67	xxxxxxx
	All other wire products	5	31	24,380	1,138	18.7	4	-	3,360	18.4	16	xxxxxxx
	Fence posts	12	32	134,700	9,890	29.4	439	-	37,942	37.6	1,033	xxxxxxx
	Black plate	12	33	462,815	89,771	77.6	2,230	27,842	246,679	71.1	5,063	83,299
	Tin plate—Hot rolled	10	34	1,527,360	129,054	33.8	17,590	-	373,795	32.6	57,131	xxxxxxx
	Cold reduced	10	35	1,956,200	458,173	94.7	55,961	-	1,191,241	82.0	121,997	xxxxxxx
	Sheets—Hot rolled	25	36	xxxxxxx	1,043,410	xxx	55,885	49,287	2,759,658	xxx	165,449	113,532
	Galvanized	16	37	xxxxxxx	335,325	xxx	27,314	-	865,645	xxx	74,127	xxxxxxx
	Cold rolled	18	38	xxxxxxx	389,422	xxx	18,809	-	1,174,467	xxx	73,904	xxxxxxx
	All other	16	39	xxxxxxx	98,268	xxx	5,760	-	286,963	xxx	12,416	xxxxxxx
	TOTAL SHEETS	27	40	11,374,065	1,866,425	65.6	107,768	49,287	5,086,733	59.6	325,896	113,532
	Strip—Hot rolled	24	41	3,209,300	292,478	36.5	9,748	46,225	759,618	31.6	23,624	109,210
	Cold rolled	36	42	1,160,910	152,222	52.4	3,136	-	398,591	45.8	7,327	xxxxxxx
	Wheels (car, rolled steel)	5	43	380,320	27,555	29.0	3,630	-	77,676	27.2	4,309	xxxxxxx
	Axles	5	44	425,900	12,918	12.1	510	-	32,362	10.1	3,434	xxxxxxx
	Track spikes	11	45	300,100	22,865	30.5	468	-	73,835	32.8	1,385	xxxxxxx
	All other	4	46	9,450	2,485	105.2	15	-	7,313	103.2	101	xxxxxxx
	TOTAL STEEL PRODUCTS	135	47	xxxxxxx	8,298,565	xxx	493,557	845,591	22,572,553	xxx	1,271,325	2,160,950
	Estimated total steel finishing capacity based on a yield from ingots of 70.0 %	-	48	48,514,000	xxxxxxx	61.4	xxxxx	xxxxxxx	xxxxxxx	56.1	xxxxxxx	xxxxxxx
	Pig iron, ferro manganese and spiegel	28	49	xxxxxxx	1,043,229	xxx	53,775	273,106	2,667,218	xxx	75,674	671,185
	Ingot moulds	4	50	xxxxxxx	90,258	xxx	479	-	208,663	xxx	808	xxxxxxx
Iron Products	Bars	9	51	147,200	7,711	21.0	31	575	20,898	18.9	87	1,240
	Pipe and tubes	3	52	97,730	9,999	40.9	223	-	29,644	40.4	527	xxxxxxx
	All other	2	53	63,560	4,153	26.1	1,005	1,325	9,862	20.7	1,636	3,567
	TOTAL IRON PRODUCTS (ITEMS 51 to 53)	11	54	250,530	21,863	34.9	1,259	1,900	60,404	32.1	2,250	4,807

Total number of companies included -- 156

Total steel products produced for sale, less shipments to members of the industry for conversion into further finished products: Current quarter 7,452,974 *G.T.;* 61.4 *% of Finishing Capacity.*
To date 20,411,603 *G.T.;* 56.1 *% of Finishing Capacity.*
The above tonnages represent 70.0 *% of the ingots produced by companies whose products are included above.*

GOING TO PRESS MARCH 1st, 1940

THE 1940 EDITION OF THE

WIRE
& WIRE PRODUCTS'

Buyers Guide
and Year Book of the
WIRE ASSOCIATION

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in Sept. 1939 and Sept. 1938
(In gross tons)

	SEPT. 1939	AUG. 1939	SEPT. 1938
Wire rods	1,829	1,477	508
Strip steel	6,852	9,878	5,619
Plain, black or galvanized iron or steel wire	4,707	4,456	5,073
Barbed wire and woven wire fencing	5,473	3,651	4,923
Woven wire screen cloth	121	101	96
Wire rope	399	171	218
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	842	578	459
Wire nails	1,482	1,726	1,974
Tacks	20	32	47
Other nails, including staples	352	431	414
Bolts, machine screws, nuts, rivets and washers	757	570	625
Total, these 11 classifications	22,834	23,071	19,956

Imports of Iron and Steel Wire Into the United States
(In gross tons)

Concrete Reinforcement bars	20	330	105
Hollow bar and drill steel	107	129	72
Wire rods	1,052	775	564
Barbed wire	1,159	1,621	671
Round iron and steel wire	185	209	167
Telephone and telegraph wire	.....	5	1
Flat wire and strip steel	202	309	180
Wire rope and strand	74	113	213
Other wire	109	103	49
Hoops and bands	1,276	2,010	922
Nails, tacks and staples	549	614	739
Bolts, nuts and rivets	7	13	62
Totals, these 12 classifications	4,740	6,231	3,745

Exports of Insulated Wire and Cable, September 1939

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Rubber covered wire	336,710	$ 73,254	202,516	$ 37,249
Weatherproof wire	165,703	23,083	45,570	8,052
Other insulated copper wire	345,104	79,674	234,148	35,831
Nickel-chrome electric resistance wire	43,102	50,648	20	13
Total, these 4 classifications	830,619	$ 226,659	482,254	$ 81,145

September Exports of Iron and Steel Higher

EXPORTS of iron and steel products (excluding scrap) in September rose to 244,933 tons from the 185,182 tons exported in August, and a corresponding raise in value to $15,481,546 from $13,391,234 the previous month. There were 196,368 tons of iron and steel products, valued at $11,142,216, exported in September 1938.

✦ ✦ ✦

IRON and steel imports (excluding scrap) in September totaled 26,658 tons valued at $1,431,318 in comparison with the 24,599 tons valued at $1,354,288 imported in August. In September, 1938, 23,739 tons valued at $1,332,011 were imported.

Scrap Exports Higher in September

EXPORTS of scrap from the United States in September increased to 330,680 tons valued at $5,100,069 from 291,896 tons valued at $4,399,583 in August. There were 145,090 tons of scrap valued at $2,051,761 exported in September, 1938.

✦ ✦ ✦

THE 330,680-ton September trade in scrap included 327,724 tons of iron and steel scrap, 1,637 tons of tin plate scrap (all of which went to Japan), 587 tons of tin plate circles, strips, etc., and 732 tons of waste-waste tin plate. Japan was still the most important purchaser of this product, taking 178,826 tons. Shipments to the United Kingdom totaled 85,527 tons, while Italy, 29,452 tons, Canada, 18,914 tons; Poland and Danzig, 8,919 tons, and Finland, 5,509 tons were also important purchasers.

✦ ✦ ✦

Pig Iron and Tin Plate High in Export Trade

PIG iron ranked first, in point of tonnage, in the September trade—its 28,192 tons going principally to Sweden, 11,240 tons, the United Kingdom, 8,450 tons, Norway, 4,651 tons, and Canada, 2,896 tons. The 27,111 tons of tin plate exported was a close second. This material went to many countries, with the more important purchasers being Canada, 5,484 tons, Brazil, 2,552, tons, the Netherlands, 2,076 tons, and the Philippine Islands, 2,007 tons. Non-alloy "other" plates came third with 20,268 tons. These were also shipped to many countries, but Sweden, 5,652 tons, Canada, 4,913 tons, the Netherlands, 2,699 tons, Norway, 1,280 tons, and Finland, 1,192 tons, were the chief purchasers. Non-alloy "black" steel sheets followed closely with a trade amounting to 20,171 tons, with Canada taking 7,082 tons, Brazil, 1,820 tons, Sweden, 1,487 tons, Mexico, 1,221 tons, and the Netherlands and the United Kingdom each taking 1,029 tons.

✦ ✦ ✦

Canada Leading Purchaser in September

CANADA with a total of 54,270 tons was by far the leading country purchasing iron and steel products. The most important items in this trade were the 13,170 tons of skelp, 7,082 tons of non-alloy "black" steel sheets, 6,827 tons of plain shapes, 5,484 tons of tin plate, 4,913 tons of non-alloy "other" plates, and 3,402 tons of non-alloy, hot-rolled strip steel. Japan, in taking 23,453 tons, was next in rank with non-alloy ingots, 11,391 tons, alloy ingots, 7,999 tons, and non-alloy "other" steel bars, 1,947 tons, the leading items. Kwantung rated third place with a total of 21,440 tons—chief products in this trade being plain

(*Please turn to Page 710*)

Exports and Imports of Wire

(*Continued from Page 709*)

shapes, 8,313 tons, non-alloy "other" steel bars, 7,703 tons, and car axles fitted with wheels, 3,279 tons. The two most important items in Sweden's 19,847-ton trade were, 11,240 tons of pig iron and 5,652 tons of non-alloy "other" plates.

✦ ✦ ✦

September Imports Higher

IRON and steel imports in September increased to 26,658 tons, with spiegeleisen, 8,349 tons, furnished entirely by Canada. Next in line was pig iron—4,176 tons—with British India, 2,700 tons, Canada, 1,471 tons, and Brazil, 5 tons, the three sources of supply. The 3,702 tons of ferromanganese came from Norway, 3,659 tons, and France, 43 tons.

✦ ✦ ✦

CARD Clothing: 11,702 square feet, $17,049 (9,504 square feet, $13,816). United Kingdom 10,250 square feet, $14,120; Belgium 1,350 square feet, $2,296; Germany 102 square feet, $633.

✦ ✦ ✦

Wood Screws

EXPORTS of iron and steel wood screws during September, 1939, totaled 18,123 gross valued at $3,197. Of this total, France took 5,402 gross valued at $998; Venezuela, 3,960 gross valued at $617; Honduras, 1,245 gross valued at $185; the United Kingdom, 1,118 gross valued at $234; Costa Rica, 860 gross valued at $115; Mexico, 858 gross valued at $129; Netherlands West Indies, 830 gross valued at $87; Finland, 810 gross valued at $226; Cuba, 754 gross valued at $197; Republic of Panama, 635 gross valued at $122.

✦ ✦ ✦

EXPORTS of brass wood screws during the same month totaled 3,034 gross valued at $1,586. Of this total Finland took 716 gross valued at $344; Netherlands West Indies, 642 gross valued at $264; Canada, 581 gross valued at $339; Cuba, 195 gross valued at $81; Guatemala, 163 gross valued at $81; Mexico, 133 gross valued at $77; Bermuda, 105 gross valued at $83; Colombia, 102 gross valued at $67.

✦ ✦ ✦

IMPORTS of wood screws during the same month totaled 21,200 gross valued at $1,571, supplied by Belgium.

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

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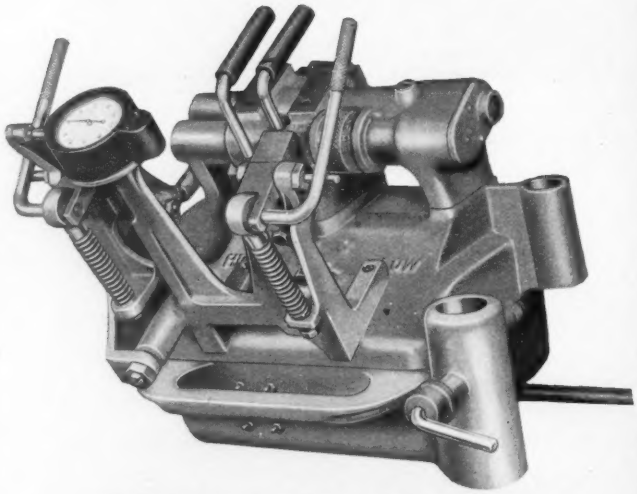
There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



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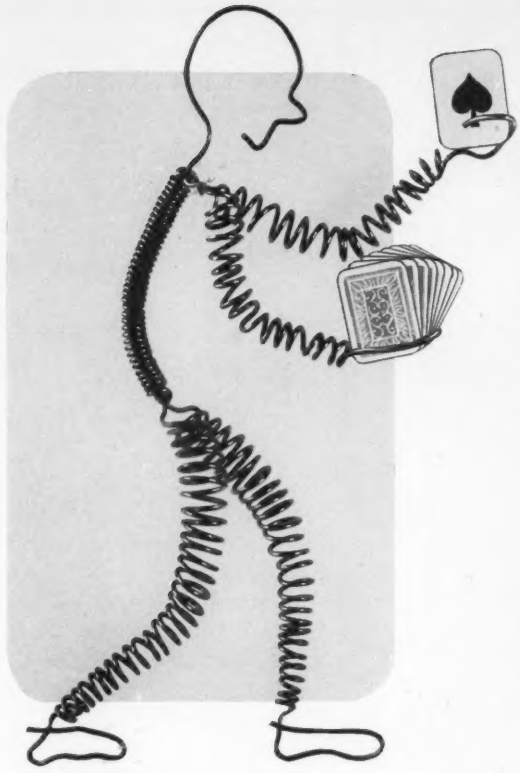
'Round the World With The Wire Industry

THE Russian - German trade agreement is very effectively affecting the German wire machinery industry and the wire trade. The German wire machinery industry had unfilled orders in hand to the value of approximately $3,-700,000 for Oversea, Great Britain and France when the war broke out. Of course, these orders cannot be executed, although moderate orders are being delivered via Italian ports by Japanese ships to the Far East. Germany has sold the bulk of the cancelled orders to Russia, getting in exchange Russian products. Besides these orders large quantities of machinery, mainly wire nail presses, and wire netting machinery have been sold to Russia for delivery beginning January, 1940. The wire industry will participate only to a moderate extent, mainly wire mesh and steel wire, but the total quantity of exports to Russia may not exceed 5.6000 t, for 3 months. Moderate quantities of wire were shipped recently to the Far East via Trieste and now the export trade to Latin America has been resumed, after a stop of about 5 weeks, mainly old contracts—at old prices—are being executed. The products are shipped by Italian Lines. It will not be possible, however, to execute all the orders booked, as the German-Latin American trade will probably be—via Italy—only 15-20% of the normal. Germany selling mainly steel, wires, chemicals, etc., and getting wool, maize seeds and oil.

✦ ✦ ✦

THE Belgian wire industry through the Union Belge des Tréfileurs is trying to execute all old contracts, although this is difficult due to lack of freight room. Whilst the Cosibel has not yet restarted selling of iron and steel up to September 15th but may do so any time now, the wire cartel is booking fresh contracts from Oversea, mainly from the Far East and Africa (mainly South Africa), although at prices which are much



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Keystone wire has a smooth way of making production troubles disappear. Nothing up the sleeve—no effort to deceive. It's all done with metallurgists—Keystone's experts who study your manufacturing problems and then—pretso!—turn up with a wire made-to-order for the job.

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SAMSON SPRING WIRE

Bright . . . Tinned
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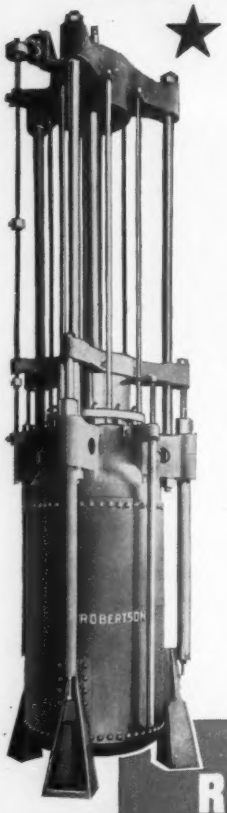
NEEDS FAR LESS SPACE!

NONE MORE COMPACT

UTILIZES ITS AIR TANK AS A BASE

EASY TO INSTALL

REQUIRES NO SPECIAL HEAVY FOUNDATION



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higher up to £1.15 (gold) above former quotations and in quantities, which up to now have not been very important.

✦ ✦ ✦

HUNGARY is trying to export more wire products and efforts are being undertaken to export 1000 t of wire products per month, an increase of 40% over the present average. Yugoslavia is now also exporting wire nails, and her trade in steel nails, always rather satisfactory, is prospering. Sweden and Norway have large orders for steel nails, ship nails, horse shoe nails, spikes, etc., but Norway as well as Denmark maintains the export prohibition for ordinary wire products. Yugoslavia has put exports of non ferrous metal wires under export control and has not yet granted any permits. Italy, however, has given free licenses for any export metal product, whereas export prohibition for barbed wire and steel wire is maintained. Wire nails and fencing wire is sold in increasing quantities for export. Holland maintains the import licenses for wires and the 1938-39 figures will remain unaltered for one year. The wire netting and wire mesh industry have large export orders, there is no export trade, however, on other products. Turkey has probihited exports of all wire products, as did Greece, but Greece is buying wire rods in large quantities.

STEEL WIRE

By MAURICE BONZEL

Translated and Published by

Kenneth B. Lewis

Consulting Engineer

Price $15.00

495 pages. 414 illustrations

SEND ORDERS TO

WIRE and WIRE PRODUCTS

A Review of Recent Wire Patents

No. 2,174,722, PROCESS OF ELECTROLYTIC CLEANSING, Patented October 3, 1939 by Ferdinand Artur Herrmann, Leipzig, Germany.

This process is said to be particularly adapted to cleaning iron or steel wire of its oxide coating.

✦ ✦ ✦

No. 2,174,839, COIL WINDING APPARATUS, Patented October 3, 1939 by Polemon V. Riddle, Auburn, Alabama.

The apparatus is claimed to provide a means for both winding a wire coil and also shaping the wire to the form in which it will be employed in three or two phase electric motors.

✦ ✦ ✦

No. 2,175,066, APPARATUS FOR AND METHOD OF TREATING WIRE FABRICS, Patented October 3, 1939 by Bradford C. Riley, Medfield, Mass.

An apparatus is provided for changing the size or shape of the mesh in woven wire fabrics, in order to give it a distinctive shape, different from that of standard woven wire fabrics.

✦ ✦ ✦

No. 2,175,069, WIRE-DRAWING MACHINE, Patented October 3, 1939 by Carl E. Tideman, Worcester, Mass., assignor of one-half to Verner G. Anderson, Worcester, Mass.

By this invention, the necessity for a control panel is avoided and the wire

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

block may be rotated at any speed between the predetermined maximum and minimum limits.

✦ ✦ ✦

No. 2,175,099, METHOD AND APPARATUS FOR PRODUCING COATED RUBBER-INSULATED CONDUCTORS, Patented October 3, 1939 by Charles W. Abbott, Larchmont, N. Y.

More specifically, the invention resides in th rubber with the rubber bonded to the coating without reducing the flexibility and stretch of the coating. There are 18 claims.

✦ ✦ ✦

No. 2,175,426, WIRE-COILING MACHINE, Patented October 10, 1939 by William H. Blount, Worcester, and Clayton F. Fisher, Spencer, Mass., assignors to Sleeper & Hartley, Inc., Worcester, Mass., a corporation of Mass.

The pitch and diameter forming cams of this machine may be readily adjusted, removed and replaced.

✦ ✦ ✦

No. 2,176.066, TIN-COATED OBJECT, Patented October 17, 1939 by Elgin Carleton Domm, Niles, Mich., assignor to National-Standard Company, a corporation of Michigan.

A method is provided which comprises immersing the object in a molten metallic bath predominantly composed of lead and antimony, and then electroplating over the entire coated surface of the object a coating of tin having a thickness of the order of 1/10,000th to 1/5,000th of an inch.

✦ ✦ ✦

No. 2,176,582, APPARATUS FOR ANNEALING MOVING WIRE, Patented October 17, 1939 by John Cook, Ridgewood, N. J., assignor to Cornish Wire Company, New York, N. Y., a corporation of New York.

The assembly includes electrodes for passing an electric current through a portion of the wire to heat it to the annealing temperature, a water bath for quenching the heated wire after annealing, an open ended electrically and heat insulated tube closely surrounding the highly heated portion of the wire, the lower end of the tube extending below the surface of the water bath a sufficient distance as to cause a local heating of the water confined in the tube to the boiling temperature and causing the confined boiling water to flash into steam to envelop the heated wire with a non-oxidizing atmosphere before it passes

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Melters and Manufacturers of "TOPHET" Resistance Wires—Nickel Chrome Alloys—Copper Nickel Alloys—Pure Nickel and Monel Wire and Strip—Stainless Steel Rods and Wire.

into the water bath and thereby prevent discoloration of the wire.

✦ ✦ ✦

No. 2,176,583, ANNEALING APPARATUS, Patented October 17, 1939 by John Cook, Ridgewood, N. J., assignor to Cornish Wire Company, New York, N. Y., a corporation of New York.

This patent covers the tube structure referred to in U. S. patent 2,176,582 (above).

✦ ✦ ✦

No. 2,176,872, METHOD AND APPARATUS FOR COILING WIRE, Patented October 24, 1939 by Daniel E. Hennessy, Leominster, Mass., assignor to Springfield Wire & Tinsel Co., West Springfield, Mass., a corporation of Mass.

It is said this machine is particularly adapted for handling very thin wire, flat in cross section, and the method consists in passing the wire between a small rotating roll and a larger, yielding roll with the length of the wire at right angles to the axis of the rolls and without winding the wire about the small roll.

✦ ✦ ✦

No. 2,176,900, METHOD AND APPARATUS FOR PICKLING COILS, Patented October 24, 1939 by Agnes Jane Reeves Greer, Morgantown, W. Va.

This is described as an improvement upon the patentee's prior disclosure in U. S. patent 2,120,843 of June 14, 1938. In the present invention, the coils are rocked back and forth in the pickling solution.

✦ ✦ ✦

No. 2,177,003, SELF - LOCKING SCREW, Patented October 24, 1939 by William A. Purtell, West Hartford, Conn.

Upon the threads of the screw is disposed a series of reverse waves in the crest on a portion of the threads, and with a normal root for this portion.

✦ ✦ ✦

No. 2,177,004, SCREW, Patented October 24, 1939 by William A. Purtell, West Hartford, Conn.

At intervals, the crests of the threads are deformed by being upset.

✦ ✦ ✦

No. 2,177,005, LOCKING SCREW, Patented October 24, 1939 by William A. Purtell, West Hartford, Conn.

A resilient trailing lip is formed between normal crest portions of the screw.

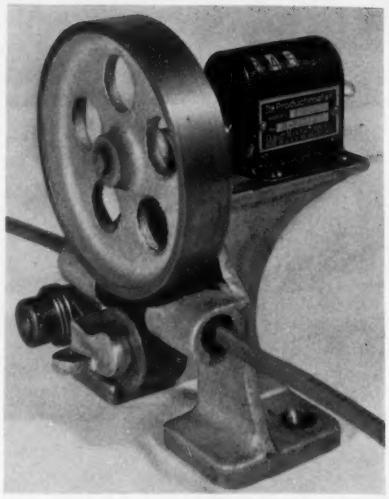
✦ ✦ ✦

New Wire Measuring Machine

THE New England Butt Company has recently developed a small measuring machine designed to measure small diameters of insulated wire sold over hardware counters.

✦ ✦ ✦

THIS equipment consists of a housing with a pair of guides to locate a wire under a wheel measuring one foot in circumference. The wheel operates a three figure reset counter and the wire



to be measured is held in contact with the measuring wheel by means of a spring back tension roller under the bottom of the assembly.

✦ ✦ ✦

THIS machine is designed for bench mounting and will measure any flexible round material not over $\frac{5}{16}$" diameter.

✦ ✦ ✦

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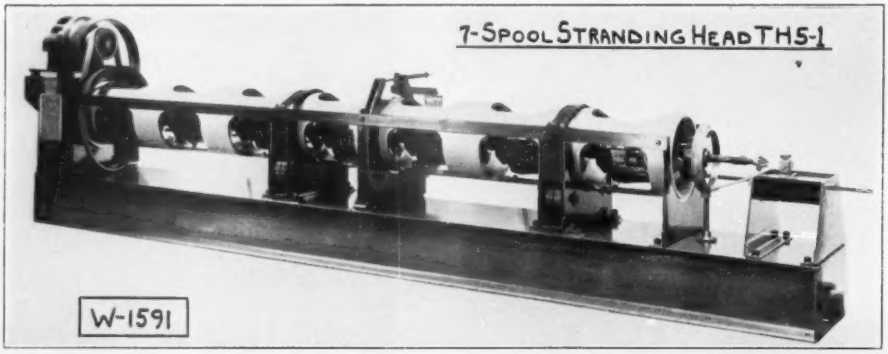


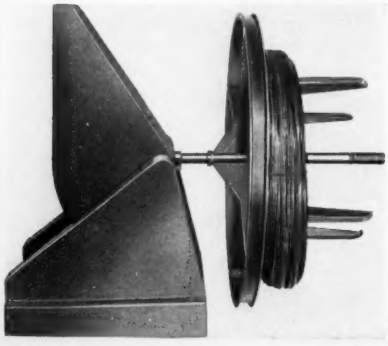
ELECTRICAL WIRE, CABLE & WIRE ROPE MACHINERY
Printed Literature Available On Considerable Of The Equipment Used In These Fields—Inquiries Are Invited

"The Shiftweight" Wire Reel

ONE of the newest and most practical wire reels ever offered to the trade is announced by the Moslo Machinery Company at 5005 Euclid Avenue, Cleveland, Ohio. This reel, known as the "Shiftweight" is a counter-balanced tilting wire reel which for the first time in wire reel history makes possible effortless one man loading. It has so many basically new features that the U. S. Government has granted Patent No. 2,152,559 covering it fully.

✦ ✦ ✦

THE reel takes its name from a shifting weight in the counterbalance which virtually does all the lifting once a wire coil is loaded, A locking latch, which hold the tilted reel in position for loading, operates through a center shaft. Being readily accessible there is no need for the operator to be off balance at any time during the loading or positioning operation.



Heretofore an operator positioning a coil had to either reach behind the reel or step on a foot lever to release latches. With the new "Shiftweight" both hands and feet of the operator are free to handle up to 300 pound coils of wire with ease.

✦ ✦ ✦

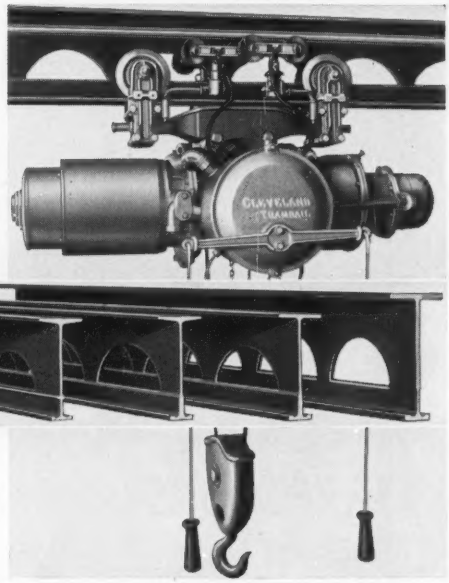
FULL 42" diameter upper guard rings allow perfect feeding of wire off the coil and make the reel absolutely snarl proof. All welded steel construction and extra sturdy coil arms assure long life under all hard usage. Adjustable friction brake prevents overrun of coil feeding. The reel is so well designed and weight is so perfectly distributed that it becomes unnecessary to bolt this reel to the floor.

✦ ✦ ✦

MR. ERNEST P. MOSLO, president of the Moslo Machinery Company, says, "Here at last is a

CLEVELAND TRAMRAIL

ARCH BEAMS



RIGHT: One ton Cleveland Tramrail electric hoist with hand-propelled carrier operating on Cleveland Tramrail arch beams.

A SIZE FOR EVERY PURPOSE

—for loads up to 5 tons

Arch beams are used for applications where regular Cleveland Tramrail rail does not lend itself to long spans or where satisfactory superstructure cannot be provided.

They consist of a wide flanged "T" member to which is welded a high-carbon long-wearing Tramrail rail with flat raised treads. The treads are hard and smooth. They eliminate troublesome peining which is common with systems subjected to severe service and continued rolling action of carriers.

Tramrail arch beams are an exclusive Cleveland Tramrail development and are available in six different depths to suit varying span conditions. They represent one of the many reasons why Cleveland Tramrail can serve you better.

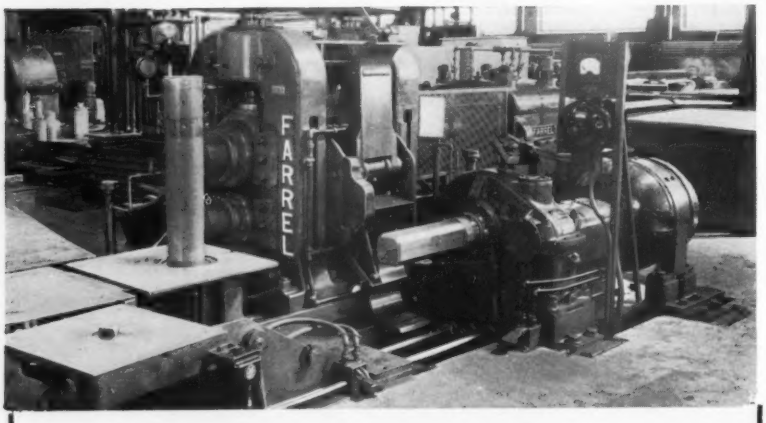
CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1141 Depot Street • Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

tilting wire reel which embodies every feature that the industry has asked for. The "Shiftweight" absolutely requires only one man to load a full coil of wire and its shifting counterweight actually takes all the effort out of bringing that coil into operating position. We wish to thank the many men whose suggestions from their daily experiences of handling wire coils have made this reel possible."

THE **Carl-Mayer Corporation**, of Cleveland, O., manufacturers of "Hi-Speed" bakers and ovens of all descriptions announces the appointment of **W. J. Bach** of the Foundry Service Company, 2321-2329—29th Avenue North, Birmingham, Alabama, as their Southern Representative on ovens of all descriptions.

✦ ✦ ✦



FARREL CONSTANT TENSION REELS

Improve Strip Quality Increase Mill Output Reduce Rolling Cost

In the cold rolling of metal strip efficient winding of the finished strip is an important factor in the quality of material, rate of output and production cost.

The Farrel Tension Reel with Jaw Type Wrapper, Stripper and Up-Ender illustrated above is one of several types of reeling equipment we make to facilitate winding and subsequent handling. It provides constant tension under positive control from empty to full reel, keeping the metal flat and straight and maintaining uniform gauge.

The reel drive is an enclosed herringbone gear reduction unit with the low speed shaft extended in the form of a spindle on which either a solid or collapsible reel is rotated for winding the strip. Close control of tension is accomplished by automatic regulation of current input to the motor. All controls are conveniently located within easy reach of the operator.

The recent installations of thirty-three Farrel Constant Tension Reels in eight plants, with a high percentage of these repeat orders, is the best indication of their successful operation.

We make various types of reels designed to fit specific requirements and shall be glad to tell you how they can be applied to your rolling mills to give you the advantages of improved quality, increased output and lower cost.

FARREL **FARREL-BIRMINGHAM COMPANY, Inc.**
ANSONIA, CONN.
New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

Rehfuss Fringe and Tassel Machines Now Manufactured and Serviced by Philadelphia Machine Manufacturer

H. W. ANDERSON, President and General Manager of the Fidelity Machine Company, Philadelphia, Pa., announces the aquisition of the business of Geo. Rehfuss & Sons, Philadelphia, Pa., covering the manufacture of the complete line of improved Fringing and Tassel Machines.

✦ ✦ ✦

THREE distinct styles of machines are now made available to manufacturers of rugs, curtains, covers, couch covers, quilts, shawls and scarfs, and Fidelity is prepared to make prompt delivery of complete machines as well as maintaining their well known service on parts and maintenance requirements.

✦ ✦ ✦

GEO. REHFUSS & SONS was one of the older machine manufacturers of Philadelphia known throughout the textile world for its line of Fringing and Tassel making machines.

HAVE YOU A PATENT, A PROCESS OR AN INVENTION APPLICABLE TO THE WIRE INDUSTRY YOU DESIRE TO SELL OUTRIGHT OR TO PLACE ON A ROYALTY BASIS?

✦ ✦ ✦

A Well Known Wire Mill Consulting Engineer Is Prepared To Present Such Matters To His Extensive Acquaintance In The Wire Industry.

✦ ✦ ✦

Correspondence Desired With Principals Only.

✦ ✦ ✦

Representation On Either A Fee Basis Or Percentage Of Royalty Secured.

✦ ✦ ✦

All Communications Held In Confidence.

✦ ✦ ✦

Box 112

WIRE & WIRE PRODUCTS
300 Main St. Stamford, Conn.

The Wire Mill of British Insulated Cable Co.

(*Continued from Page 695*)

Tinning

COPPER wire for use in vulcanized rubber cables has of course to be tinned and a special process is in use at Prescot with the object of obtaining a complete and uniform coating on the wire, which is untouched by hand during the operation. A very large mileage of fine wires is tinned for use in flexible cords and cables and as fuse elements. Wires for use in paper insulated and weatherproof aerial cables, cotton covering, etc., are left plain.

✦ ✦ ✦

Trolley and Contact Wires

IN the production of trolley and contact wires, and rods, after rolling, are pickled, as already described and are scarf jointed with silver solder, if necessary, before drawing. For this latter purpose a special multiple block machine has been adopted and wires of round or various grooved sections are produced in copper or Copper Cadmium alloy. The sizes range from No. O. B. & S. to .3 sq. inch. The wire mill has at present in hand a large order for grooved contact wire of heavy section for railway electrification in England.

✦ ✦ ✦

Miscellaneous Products

IN addition to wire production a large variety of strips, busbars, commutator bars, and other cold drawn sections are made from rolled or extruded copper. In the smaller sizes strips are also produced from drawn wire by flattening in cold rolls. The naturally radiused edge which this method gives is advantageous in the case of strips for cotton or paper covering.

✦ ✦ ✦

A CENTRALLY situated packing and export room handles material for despatch. A gravity conveyor runs down the center of the room and automatic coil lapping machines are installed.

Testing

ALL the routine tests on wire are done in this room or nearby test rooms so that purchasers' inspectors can examine material and see it tested on the spot. Tests cover Conductivity, Tensile strength, Elongation, Torsion, Lapping, Hardness and Fatigue.

✦ ✦ ✦

TWO interesting items of plant in the test rooms are a motor driven torsion testing machine with inter-locked electrical cut-off, for testing railway contact wires up to .3 sq. inch sectional area, and a Haigh-Robertson Fatigue Tester, which registers the number of stress reversals required to cause failure in hard drawn wires. Hardness is determined on a Brinell machine, or on a Vickers Pyramid machine using a diamond indentor.

✦ ✦ ✦

Research

THE wire mill maintains a technical section the services of which are available to all customers for their particular metal

(*Please turn to Page 718*)

4 QUESTIONS

on pickling stainless steel wire ... all answered by the use of

FERRISUL

(Anhydrous ferric sulfate)

QUESTION: What pickling chemical reduces metal loss?

ANSWER: Exhaustive tests have proved that there is a substantial decrease in metal loss when Ferrisul is used, providing savings in metal and in acids.

QUESTION: What pickling chemical is safe to handle?

ANSWER: Practically no fumes arise from Ferrisul solutions, making them safe for workmen. Since Ferrisul comes in dry, granular form, it is safe and convenient to store and handle.

QUESTION: What pickling chemical delivers a better product?

ANSWER: The use of Ferrisul in pickling stainless steel wire produces a smoother product free from pits and scratches . . . making possible higher speeds of drawing.

QUESTION: What pickling chemical costs less to use?

ANSWER: The cost of Ferrisul Hydrofluoric solutions is usually less than those using Muriatic or Nitric-Hydrofluoric acids. Pickling baths last longer and shut-downs for cleaning and renewing pickling baths are less frequent.

All in all, it will pay you to investigate Ferrisul for pickling stainless steel wire. Why not write for further information today?

MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston, Massachusetts.

MONSANTO CHEMICALS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

The Wire Mill—British Insulated Cables, Ltd.

(*Continued from Page 717*)

problems. The section investigates metallurgical problems such as behavior of copper and aluminum and their alloys under test and in service, in addition to which the mill can also call upon the Company's main laboratories and research station.

✦ ✦ ✦

SUBJECTS upon which much work has recently been done are high conductivity oxygen free copper, alloys for use as welding rods and a heat treatable alloy which will withstand high temperatures of the order of 400°C. without softening.

✦ ✦ ✦

New Type Wire Rope Clamp

A NEW type of wire rope clamp primarily designed to make the handling of wire rope a safer undertaking is announced by the National Production Company of Detroit, Michigan. The "SAFE-LINE" Clamp also converts the expensive method of splicing and serving of a wire rope into an economical operation.

✦ ✦ ✦

FROM a standpoint of safety this new type of clamp marks a step in advance of clamps heretofore on the market. The rounded and smooth outer surface safely incloses all the dangerous sharp ends of the wire rope. There is nothing to scratch or injure the hands, nothing to catch on clothing, to foul on other mechanical apparatus with which it may come in contact.

✦ ✦ ✦

THE security of the grip is another advantage claimed for this revolutionary type of clamp. Its tremendous holding power is in excess of the cable strength and in a long series of tensile pull tests to destruction, made with he strongest wire rope available, this Clamp has demonstrated its unfailing ability to maintain its grip beyond the breaking strength of the cable. It is claimed that, by doing away with splicing and serving, this new Clamp reduces the cost of a loop to a new low because it takes much less time and does not require the services of a skilled workman to do the job. It is simple in design, consisting of but four parts, and is so easy to assemble that a tight joint can be made by anyone. It can be done as easily in the field as in the shop.

✦ ✦ ✦

UNLIKE a spliced joint or zinced-in socket, a joint made with this Clamp can be quickly readjusted to the proper tension at any time without additional expense.

✦ ✦ ✦

THIS Clamp is made of high tensile strength steel only. It comes in 9 different sizes to fit cables from $\frac{1}{8}$" to $\frac{3}{4}$" in diameter.

Syncro's first again!

with a Magnetic Slip Clutch for its Take-Ups and Wire Drawing Machines

The Syncro Magnetic Slip Clutch is used in driving practically all Syncro Take-Ups and many Syncro Wire Drawing Machines to give a smooth, shockless drive.

Designed so no mechanical slippage occurs, wear is eliminated in the Syncro Magnetic Slip Clutch. Moreover, it employs no slip rings or moving electrical connections anywhere in its construction.

The power transmitted by the Syncro Magnetic Slip Clutch can easily be adjusted by means of a rheostat to obtain the desired wire tension, which remains practically uniform throughout the spoolng of a reel.

Write for complete information regarding this latest, highly important Syncro development.

Syncro Machine Company

420 Lexington Avenue NEW YORK

Represented in Canada by — Canadian Elevator Equipment Co., Ltd., Toronto.

For Information Regarding The Wire Association Address

Richard E. Brown, Secretary

300 Main Street, Stamford, Conn.

Annual Convention of the Wire Association

(*Continued from Page 700*)

DR. S. A. BRALEY, Chief Metallurgical Field Engineer, Pittsburgh Steel Company, Pittsburgh pointed out in the Mordica Memorial Lecture that the production of wire materials for fabricated products is a comparatively recent development and emphasized that today the trend of the wire industry is toward copper-bearing steels ranging from 0.20 to 0.30 per cent copper and designed to produce material of uniform quality.

✦ ✦ ✦

Plant Inspections

IN addition to the technical papers presented there were two plant inspections, one to the Hawthorne Works of the Western Electric Company and one to the South Chicago Wire and Nail Plant of the Republic Steel Corporation.

✦ ✦ ✦

Motion Pictures

DR. D. M. SIMMONS, Chief Engineer, General Cable Corporation, New York, presented motion pictures of Boulder Dam and transmission lines and the Uddeholm Company of America presented a film showing the oldest and largest steel mill in Sweden, Uddeholm's A. B. with 10,000 employees, extending over 100 miles and with a plant dating back 700 years.

✦ ✦ ✦

Annual Wire Association Luncheon

THE Guest Speaker at the Annual Wire Association Luncheon was **Major General J. O. Mauborgne,** Chief Signal Officer of the Army. In his talk he pointed out that the War Department requirements embraced over 300 different items of wire and wire products.

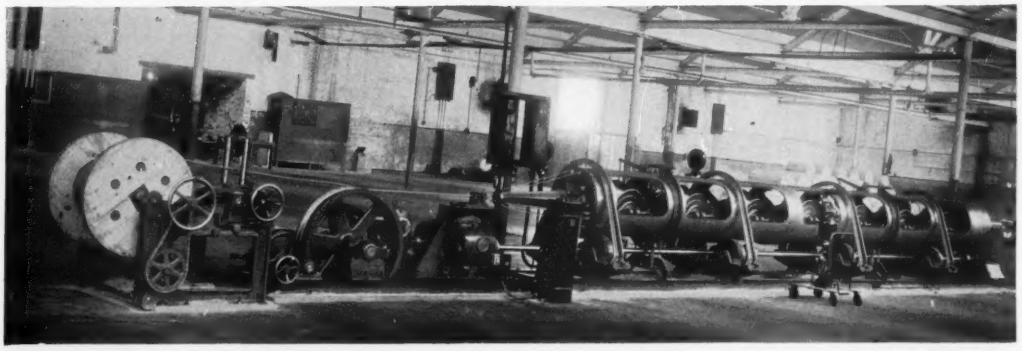
✦ ✦ ✦

HOWEVER he presented his talk principally on the subject of army communication wire, stating that despite the development of radio and other means of communication, wire must continue to carry the load of military communication in case of war and that literally "mountains of wire" would be required in the event of war, because of wide-spread destruction by air raids, the passage of tanks, destruction by shell fire etc. He disclosed that the Signal Corps alone purchases about 30,000 items and expressed the opinion that the wire requirements for war appear to be beyond the resources of the wire manufacturers at the present time.

✦ ✦ ✦

HOWEVER, since the meeting, arrangements are being made by a group of wire manufacturers to take the question up of military requirements with a view to correlating such wire requirements with the ability of the industry to produce and it is hoped that this work, which is sponsored by the Fine Wire Association, will be of profit to both the Government and the manufacturers.

Announcing the New 1940 Model National Tube Type Strander



THIS Strander is equipped with variable speed haul-off eliminating the use of change gears. With the new National Strander, changing lay lengths is but a matter of seconds.

✦ ✦ ✦

CHANGING from right lay to left lay requires only the shifting of clutch lever; electric brakes of latest type add much to the efficiency of operation.

✦ ✦ ✦

THIS Strander is equipped with ball-bearings throughout, has Textilite tube rollers and Carboloy wire guides, quick operating bobbin latches and bobbin brakes.

✦ ✦ ✦

Made for 9″, 12″, 16″ and 22″ standard bobbins.
Equipment for Wire and Rubber Industries.

NATIONAL RUBBER MACHINERY CO.

General Offices: **AKRON, OHIO**

Banner Division, **COLUMBIANA, OHIO**
Eastern Division, **CLIFTON, N. J.**

David Bridge & Company, Ltd., Manchester, England
The Bawden Machine Company, Ltd., Toronto, Canada

Trends in Applications of Atmospheres to Heat Treatment of Copper and Copper Alloys

(*Continued from Page 702*)

atmosphere. Another means of accomplishing the same purpose is to circulate a portion of the products of combustion through an extraneous cooler, introducing cool gases back into the furnace to make up the necessary volume.

✦ ✦ ✦

THE larger of these direct fired units were orginally constructed with direct quench, the temperature of the quench water being controlled so that any residual matter adhering to the product flashed off upon exit from the furnace. These furnaces were particularly adaptable to the annealing of tubing and rod where quantities of water would not be held by adhesion or the capillary action of closely wound layers of material.

✦ ✦ ✦

SINCE these furnaces worked so satisfactorily on applications made in conjunction with spray quenches, the industry soon turned to similar furnaces constructed to operate in conjunction with dry cooling chambers. In these furnaces, no change was made in the furnace construction itself, with the exception that a slow cooling chamber was added on the discharge end. Since it was impossible to utilize a wet atmosphere in the slow cooling chambers, the atmosphere for the cooling chamber was obtained by withdrawing a portion of the flue gases from the heating chamber, circulating them through a cooling and drying unit, and reintroducing them into the cooling chamber. This is necessary to prevent infiltration of moist products of combustion from the heating chamber into the cooling chamber. Such furnaces are being used satisfactorily for the annealing of coiled sheet and refrigerator tubing, as well as other products where water staining would be detrimental to the finished product.

✦ ✦ ✦

RECENTLY, a great deal of interest has been aroused in the Non-Ferrous Industry in connection with the use of convection heating with controlled atmospheres. These furnaces consist merely of a modification of the direct fired furnaces discussed above, in that the products of combustion developed in heating the furnace are used as a protective atmosphere. The only difference in construction lies in the fact that the furnaces are equipped with recirculating fans which artificially create a high degree of recirculation in the heating chamber with a resulting increase in heating rates. In many cases, convection type furnaces have been simplified by burning all of the gas required for heating in small extraneous combustion chambers, recirculating the hot products of combustion by means of the recirculating fan. This method of heating has eliminated the multiplicity of burners generally common to direct fired furnaces, and has considerably simplified maintenance and control.

✦ ✦ ✦

Effective Tinning Bath Blanket Developed — Losses In Tin Dross Eliminated

W. H. SPOWERS, JR., consulting engineer, 551 Fifth Ave., New York City, announces a new effective and most economical liquid blanket for tin baths which has been recently placed on a commercial basis. The development covered a long period of research in the Spowers laboratories and was conceived while experimenting with hot galvanizing methods.

✦ ✦ ✦

THE new tin bath prevents the formation of any dross or oxides on the surface of tin baths. Due to the cost of tin per pound in this operation, the prevention of this residuum loss is a very interesting development in the tinning art.

✦ ✦ ✦

FOR instance, in tinning No. 18 ga. wire in one small molten tin bath, a manufacturer of wire found the consumption of tin was reduced from an average of 103 pounds per week to 58 pounds per week. In other words, the net saving of tin fed to the bath was from 13.6 lbs. per ton of finished wire to 8.1 lbs. per ton of finished wire.

✦ ✦ ✦

THE formula used for this blanket is simple and may be easily made up by the operator in the shop. Obviously any economies in the hot tinning process should be of interest to those engaged in this field.

✦ ✦ ✦

W. H. SPOWERS, JR.

ANNOUNCES

The perfection of a liquid blanket for molten tin baths which effectively prevents the formation of tin dross or oxides.

●

W. H. SPOWERS, JR.

Consulting Engineer

551 5th Ave., New York City

WANTED TO BUY

Cable stranding machines accommodating 18 to 22 gauge wire, also continuous helical machine. Reply to Box No. 315, c/o

WIRE & WIRE PRODUCTS

POSITION WANTED

Experienced in management of wire drawing, spring making and allied arts. Will go anywhere.

Box 314

Wire & Wire Products

POSITION WANTED

By competent man having twenty years experience in the making and recutting of diamond and carbide wire drawing dies. Now employed. Will give full particulars by return mail.

Address Box 311

WIRE AND WIRE PRODUCTS

Stamford, Conn.

Situation Wanted

Engineer with eighteen years in industrial field, including fifteen in Wire Rope industry, desires new connection. Experience covers plant engineering, ten years plant management, sales and sales engineering. Full details on request.

Box 312 c/o

WIRE & WIRE PRODUCTS

POSITION WANTED

25 years' experience drawing low and high brass wires, phosphor bronze, monel, nickel-silver, copper, etc. Last 12 years specializing fourdrinier wires. Experienced pot, bright or strand annealing tube furnaces. 20 years as supervisor of wire drawing plant. All necessary references furnished upon request. Address Box 310.

WIRE & WIRE PRODUCTS

This is an invitation for you to become a member of The Wire Association. ✦ ✦ ✦ ✦ ✦ ✦

The Annual Dues are $10.00

For Details Address

Richard E. Brown, Secretary

The Wire Association

300 Main St. Stamford, Conn.

Tel. Stamford 3-0482

Trends in Applications of Atmospheres to Heat Treating of Copper and Copper Alloys

(Continued from Page 720)

Other Applications

ONE of the most outstanding recent developments is the continuous annealing of wire in open gas flames. This equipment consists of a long row of accurately controlled gas flames. The flames meet end to end, and the wire passes through dies which hold the wire in the exact portion of the flame necessary to obtain proper temperature and bright surface.

✦ ✦ ✦

Wire Annealing

WIRE is handled with this equipment at speeds up to 1500 feet per minute. Most of the units built so far are for use on No. 6 (0.162 inches) to No. 16 (0.051 inches). Smaller units to handle wire as small as No. 36 (0.005 inches) are being made.

✦ ✦ ✦

THIS equipment offers many advantages for the annealing of wire. It eliminates the necessity of any furnaces and permits straight line production with saving in gas fuel, better and more uniform anneal, cleaner surface, and reduction in labor and floor space.

✦ ✦ ✦

THIS method of wire annealing is being tied in with the enameling operation and at various speeds, is used as an anneal-pickle-tin combination. In this operation, the pickling is accomplished by passing the wire through a chamber containing chlorine gas and other vapors which effect a very satisfactory cleaning and fluxing. From the pickle chamber, it passes into a cast iron tube into which molten tin, at a proper temperature, is pumped at a very low pressure. This method of producing tinned copper wire has been found to produce work with greater uniformity of coating and color.

✦ ✦ ✦

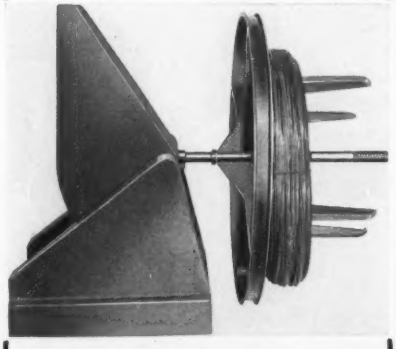
Present Trends

THE foregoing would indicate that the present trend in controlled atmosphere equipment in the Non-Ferrous Industry lies along the lines of simplification of

THE "SHIFTWEIGHT" TILTING WIRE REEL

A counter-balanced tilting wire reel with full 42" diameter upper guard rings, allowing perfect feeding of wire off the coil and absolutely "Snarl Proof."

No Levers — Locking Mechanism Controlled Through Shaft. One man can handle up to 300 pound coils as with this "Shiftweight" design both hands and feet of the operator are free.



Weight so distributed that reel need not be bolted to floor.

Moslo Machinery Inc.

5005 Euclid Ave.

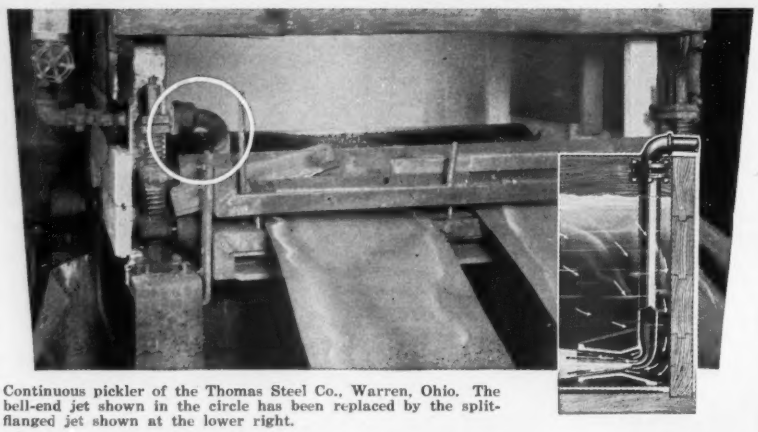
Cleveland Ohio

Wire Reels Rod Bakers

Spot Welders Roll Straighteners

Wire Straightening and Cutting

✦ ✦ ✦ Machines ✦ ✦ ✦



Continuous pickler of the Thomas Steel Co., Warren, Ohio. The bell-end jet shown in the circle has been replaced by the split-flanged jet shown at the lower right.

That's Where You Find DURIRON

where the acid is active, hot, vicious—where the moving sheet of steel is quickly pickled for the next operation.

The Duriron jet shoots in the steam to keep the pickle liquor at the right temperature. The steam tries to wire-draw it, tear at it, rip it out, but has to give up. The Duriron jet sits smugly in the corner, forcing the steam into circulating, heating, agitating the liquor so that finishing costs will be reduced.

Duriron Steam Jets will do that much for you—and save you money in doing it.

For bulletins, just write

THE DURIRON COMPANY, Inc.

445 N. FINDLAY ST. DAYTON, OHIO

Announcing A Special Issue For January, 1940

SPECIAL BECAUSE:

The discussions on technical papers at the annual meeting of the WIRE ASSOCIATION will be published in their entirety in the regular January issue of WIRE and WIRE PRODUCTS.

✦ ✦ ✦

The Directors of the WIRE ASSOCIATION have approved this plan to provide these discussions to all subscribers without extra expenditure.

✦ ✦ ✦

TO OUR ADVERTISERS:

The advertising value of this special arrangement to be followed in the January issue of WIRE and WIRE PRODUCTS is obvious.

✦ ✦ ✦

Standard rate card will apply to this issue.

✦ ✦ ✦

Closing date — December 20th, 1939.

✦ ✦ ✦

RESERVE YOUR SPACE AT ONCE

WIRE & WIRE PRODUCTS

300 MAIN STREET PHONE STAMFORD 3-0482 STAMFORD, CONN.

furnaces and the elimination of as much auxiliary equipment as possible. At the present time, it would seem that future installations would utilize the products of combustion from the heating burners as atmosphere. Except in special installations, it is unlikely that it will be necessary to provide atmosphere preparation units as auxiliary equipment. As a matter of general interest, which is not particularly related to a discussion of atmospheres, we might say that convection heating is becoming more widely accepted in cases where the work has poor heat absorbing quality, such as coiled sheet, or coils of wire or tubing.

✦ ✦ ✦

IN connection with competitive fields, we can say that gas has been used universally on all of the controlled atmosphere furnaces now in operation. In a number of instances where oil has been installed to give a so-called clean finish, the oil has been replaced by gas. With the advent of direct firing and with the elimination of auxiliary atmosphere producers, electricity has been placed in a very poor competitive position, except in rare instances where gas rates are extremely high. Even in such cases, it is necessary for electrically heated equipment to burn gas in an atmosphere producer to supply the necessary protection to the work.

✦ ✦ ✦

AMERICAN GAS ASSOCIATION NON-FERROUS METALS COMMITTEE

(Industrial Gas Section)

Ralph D. Hawkins, The Bridgeport Gas Light Company, Bridgeport, Conn., Chairman.

T. F. Loughry, Surface Combustion Corporation, New York, N. Y., Vice-Chairman.

W. W. Young, Consulting Engineer, Watertown, Conn.

Robert LeMay, Connecticut Light & Power Company, Waterbury, Conn.

C. B. Kentnor, Jr., W. S. Rockwell Company, New York, N. Y.

O. D. Pritchard, The Brooklyn Union Gas Company, Brooklyn, N. Y.

✦ ✦ ✦

ANNOUNCEMENT is made that **J. C. Joublanc,** formerly Technical Director, Electrode Division, Harnischfeger Corporation, is now with R. G. LeTourneau, Inc., manufacturers of Road Machinery of Peoria, Illinois.

A Change Needed in Federal Labor Policy

"THE legislation and pro-labor policy of the Administration now causing the steady advance of average factory wage rates in the face of a declining or stationary farm price level, simply intensify the price distortion now current," say Allen W. Rucker and N. W. Pickering, business economists, in a study just published by Farrel-Birmingham Company, Inc., of Ansonia, Connecticut. The authors continue: "If, as the circumstances attending the present position of farm commodities strongly suggest, farm prices and income will not soon be raised and sustained by war-time demand, the distortion of industrial prices will retard if not prevent any widespread and protracted recovery in the near term."

✦ ✦ ✦

ACCORDING to these authors, "Federal legislation is exerting terrific pressure to force up wage rates . . . both the Walsh-Healy and Fair Labor Standard Acts permit no expansion in working hours, the time - honored method whereby labor could increase its income per week and per year with better business and advancing food prices. The current reduction in the working week to 42 hours automatically diminishes the present income of those now fully employed, virtually compelling them in self-defense to demand higher wage rates as an offset."

✦ ✦ ✦

THE authors point out that France tried a New Deal along the lines of our own, but found that while the nation might endure for some time the evil effects resulting in a time of peace, it could not do so with war impending. The New Deal was scrapped by giving the Premier dictatorial power to do so, the foolish and uneconomic wage rate structure revised and the deadly 40-hour week abandoned.

✦ ✦ ✦

"IT is difficult to see how we can avoid having to do exactly the same thing and the outbreak of the war will probably make the move more immediate than otherwise.

✦ ✦ ✦

"THE notion that these moves will penalize labor is, of course, a misconception. Insofar as labor now unemployed is concerned, nothing could better be calculated to provide jobs than just that type of expansion. Insofar as those who are employed are concerned, the removal of the ceiling on working hours is precisely what is needed to permit each individual to resume control over his own income and to increase it by more work.

✦ ✦ ✦

"IN its arguments for enforced wage rate increases, labor has often neglected to keep in mind that shortening the work week is the factor which limits the weekly and annual income of employees and appears to make the minimum wage necessary. If the national plant were operating full time at 48 hours a week, there would be little or no complaint. It is a sad commentary that with shorter working hours and higher wage rates, present incomes are usually less—or non-existent—than before the enactment of Federal wage legislation."

✦ ✦ ✦

IN conclusion, Messrs. Rucker and Pickering assert: "In all respects, modification of present labor legislation will benefit the national economy. The farmer especially will be the gainer by the re-opening of the domestic market for his products and a balancing of industrial prices with his income. And when the farmer is in that position, he is the largest single market in the domestic economy—well able to make effective a demand which could easily tax our industrial facilities to the utmost."

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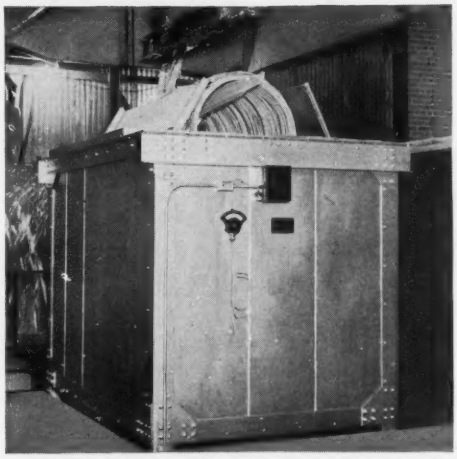

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For Information Regarding The Wire Association Address

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300 Main St., Stamford, Conn.

Wire Used For Growing Potatoes

By Bob McLean,
Oakland, California

A NEW and hitherto unheard of method of growing potatoes and other vegetables by the use of ordinary **chicken wire** has recently been perfected by **Dr. William F. Geriecke,** a scientist at the University of California.

✦ ✦ ✦

DEPARTING radically from all known methods of agriculture, Dr. Geriecke's process requires some 100 tons of chicken wire annually, to supply the eight experimental stations under his supervision in California and Nevada. The new method of raising potatoes, carrots, turnips, and other vegetables, entirely eliminates the use of soil. The vegetable seeds are simply "planted" in a cement tank which contains a solution of water and chemicals necessary for their growth.

✦ ✦ ✦

A MOVABLE frame of chicken wire is set into the tank directly above the solution, then a layer of wood shavings placed on the wire frame. Moist sawdust spread thickly on top of the wood shavings, forms a bed for the seeds. Although the initial cost of the new method is at present somewhat more expensive than that for ordinary farming, it has many advantages.

✦ ✦ ✦

CROPS do not have to be rotated, the "soil" never tires, production is an all-year affair without regard to seasons, and harvesting simply consists of picking up the vegetables without digging or hoeing. Some startling yields are possible under Dr. Geriecke's method, as shown by the following table:

Yields Per Acre (Ordinary Methods)		Yields Per Acre (Dr. Geriecke's Method)
7,000 lbs.	Potatoes	69,000 lbs.
100 crates (6 doz. ears each)	Corn	950 crates (6 doz. ears each)
140 bushels	Beans	1,500 bushels
75 bushels	Peas	825 bushels
700 bushels	Spinach	8,400 bushels

✦ ✦ ✦

POPULARLY known as "bathtub farming," Dr. Geriecke's new method of agriculture is destined to become an important factor in American life. For one thing, it will be a boon to harassed farmers in flood and dust storm areas. Even if their lands are denuded of every bit of top soil, they can still raise superlative crops. Also, bathtub farming does away with laborious plowing, harrowing and cultivating. Perhaps, within the next few years, old time agriculture will discard its outmoded implements and replace them with the simple cement and **wire** equipment needed for the synthetic production of crops.

✦ ✦ ✦

A "battery" of cement tanks with chicken-wire frames, used by Dr. William F. Geriecke for the synthetic growing of potatoes and other vegetables without the use of soil. ✦ ✦ ✦

Dr. William F. Geriecke, University of California scientist, inspecting a crop of potatoes grown on wire frames by his newly developed "bathtub" process. ✦ ✦ ✦ ✦ ✦

The Discussions at The Wire Association Meetings Will Be Published in Detail in the January, 1940 Issue of Wire and Wire Products.

✦ These Discussions — In Connection With the Published ✦
✦ Papers Will Contain Information of Great Value To All ✦
✦ Wire Production Men — Be Sure To Secure A Copy. ✦

Machine To Give Bright Finish To Wire

A NEW development by the Lewis Foundry & Machine Division of Blaw-Knox Company looks like a pilot mill but is really a production unit of novel type. It is a planishing mill equipped with a coil winder which was developed in response to the request of a wire producer.

✦ ✦ ✦

IT is designed to give lustre to dull coated wire without damage to the coating. Efforts to brighten the wire by drawing through dies inevitably resulted in some loss of coating. This loss is avoided by the rolling action of the two-pass mill.

✦ ✦ ✦

THE two roll stands are at 90 degree angles to each other to insure planishing of the full surface of the wire. Motive power is applied through the winder. The unit is built to keep pace with one wire production line, the wire coming from the coating bath in rough coils, being set on reels, then drawn through the mill and rewound into finished coils. The total weight of the unit shown is about 1600 pounds.

✦ ✦ ✦

COMPANY engineers report that the design can be adapted to provide a sizing mill at the end of a rod mill roll train.

✦ ✦ ✦

Shortage of Waxes Foreseen

FORESEEING the difficulties of obtaining certain waxes, glycerine, etc., due to war conditions, the Glyco Products Co., Inc., have been working for the last twelve months on producing a series of products to replace materials which can no longer be obtained, or are obtainable only at a very great increase in price.

✦ ✦ ✦

SUBSTITUTES for carnauba wax, montan wax, beeswax, ozokerite, glycerine, etc. are now available, and the Glyco Products Co., Inc., 148 Lafayette St., New York, N. Y. will be very glad to give information on these materials to all chemical manufacturers interested in replacing high priced and hard-to-get products.

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Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

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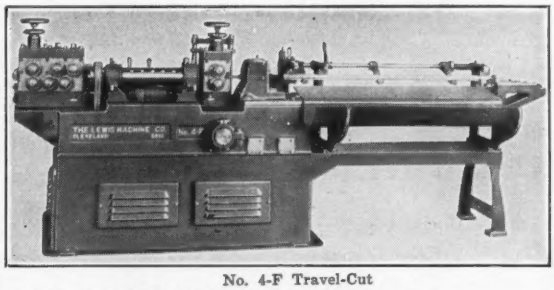

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Strike-Loss Formula

By Cruse Carriel,
Secretary,
Public Information Committee,
Southern Californians, Inc.

TO estimate accurately the economic losses resulting from strikes is difficult. However, in any strike, one factor readily ascertainable is the actual wage loss in dollars and cents of the employees. With this figure at hand, an application of the following formula will give a fair approximation of the various other items of economic loss resulting from a given strike:

1/ To obtain the loss item indicated, multiply the total wage loss in the given strike by the multiplier shown after the item below:

2/ Employers' overhead loss 1.315

3/ Employers' added expense 0.147
Materials in process tied up ... 2.954
Value of orders tied up 5.558
Local business losses in strike area 1.038

4/ Losses to directly related and affiliated businesses 8.184

5/ Total tied up business transactions (including wage loss) 20.4563

✦ ✦ ✦

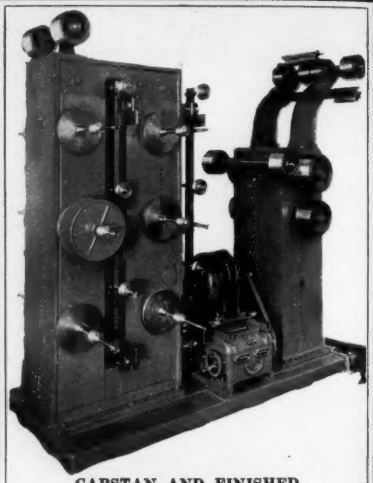
Explanation

GUSTAV RICHARD STAHL, executive secretary of the National Bureau of Economic Research, presented a carefully calculated estimate of the monetary economic losses resulting from strikes before the U. S. Senate's subcommittee on finance, which recently reported its hearings on profit sharing systems. The totals reported by Mr. Stahl, for the years 1933-1937 inclusive, in millions of dollars, were: wage loss, 345.8; employers' overhead loss, 554.7; employers' added expense, 51; materials tied up, 1021.5; orders tied up, 1922; local business losses, 358.8; losses to directly related and affiliated businesses, 2830; total tied up business transactions, 7083.8, or $7,083,800,000 — over $50 for each person in this country. The foregoing formula was obtained by using the amount of wages lost as a divisor of the other items.

✦ ✦ ✦

1/ Wage-loss unit represents the wages lost based on the total number of days men were out of jobs, using national average, adjusted by years and industries.

2/ Employers' overhead includes salaries of management and supervisory staff, rent, interest, depreciation and



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obsolescence and everything usually counted as overhead.

3/ Added strike expense includes guards, lawyers, extra fences, repair of damage to property.

4/ Directly related and affiliated businesses are those which merchandise, transport, finance or distribute products or services, either raw, semi-manufactured, or finished at any stage of the general production-distribution-consumption cycle.

5/ This item represents shrinkage in total national business turn over and represents tie-up of purchasing power.

✦ ✦ ✦

IN the formula, the multiplier, 20.4563, represents the sum of the preceding multipliers, plus 1 for the wage loss. The figure is slightly greater than addition indicates it should be because, in the formula, the separate multipliers were not carried to the ultimate decimal place.

✦ ✦ ✦

N.E.M.A. Elects New Officers

CHARLES E. SWARTZBAUGH, president of the Swartzbaugh Manufacturing Company, Toledo, was elected president of the National Electrical Manufacturers Association at the annual meeting. A budget carrying on current promotional projects and authorizing preliminary studies in the field of commercial and industrial electrification was approved.

✦ ✦ ✦

ELECTED as vice presidents of the association were Howard E. Blood, Ralph Kelly, F. W. Magin, E. O. Shreve and G. C. Thomas, Jr. Leonard Kebler was elected treasurer.

✦ ✦ ✦

Eastern Tool & Mfg. Co. To Build New Plant

PLANS for a $110,000 factory building were filed with the Belleville, N. J., building department by the Eastern Tool & Manufacturing Company of Bloomfield, N. J.

✦ ✦ ✦

THE new plant, with 48,500 square feet of floor space, will be located near the Belwood Park station of the Erie Railroad. E. R. Stearn & Company of Montclair is the general contractor.

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Copper and Brass Research Association Elects Officers

F. S. CHASE, president, Chase Brass & Copper Co., Inc., was re-elected president of the Copper and Brass Research association at its eighteenth annual meeting, Hotel Biltmore, New York, Oct. 19. He has been president of the association for many years.

✦ ✦ ✦

OTHER officers elected: Vice presidents, John A. Coe, president, American Brass Co.; C. D. Dallas, president, Revere Copper & Brass, Inc.; Wylie Brown, president, Phelps Dodge Copper Products Corp.; treasurer, C. D. Dallas; secretary, Bertram B. Caddle.

✦ ✦ ✦

THOSE elected to the executive committee were: J. A. Doucett, Revere Copper & Brass, Inc.; C. L. Coe, Chase Brass & Copper Co., Inc.; F. E. Weaver, American Brass Co.; Wylie Brown; W. M. Goss, Scovill Mfg. Co.; H. W. Steinkraus, Bridgeport Brass Co.

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ACCORDING to data presented by the American Iron & Steel Institute, charges for depreciation and depletion of steel plant equipment and properties averaged nearly $5 per ton of finished steel produced in 1937 and 1938.

✦ ✦ ✦

THIS is an increase of nearly 30% over depreciation and depletion charges per ton in 1928-1929.

✦ ✦ ✦

MORE rapid obsolescence of steel plant equipment in recent years as a result of technological progress, and the installation of more expensive equipment, have increased the rate at which plants and equipment depreciate. These have been major factors in raising depreciation and depletion charges per ton from $3.85 in the 1928-1929 period to an average of $4.95 in 1937 and 1938. Another factor was the 27% decline in average annual output between those two periods.

✦ ✦ ✦

AN average of $142,700,000 was charged annually for depreciation and depletion in 1937-1938, a reduction of less than 6% from average annual depreciation charges in 1928 and 1929. In the 1928-1929 period, total charges for depreciation and depletion represented 3.9% of the total property value, while in 1937 and 1938, depreciation and depletion charges were equivalent to 4.3% of the value of the industry's plants and properties.

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AUTHORS

Contributing the Leading Articles to WIRE AND WIRE PRODUCTS During the Year 1939

ALLEMAN, N. J.,
Dept. of Theoretical & Applied Mechanics,
University of Illinois,
Urbana, Illinois.

BARKER, L. B.,
Schenectady Works Laboratory,
General Electric Company,
Schenectady, New York.

BURDICK, W. E., Engineer,
General Steel Castings Corporation,
Eddystone, Pennsylvania.

BURNS, COLONEL JAMES H.,
Executive to the Assistant Secretary of War,
Colonel, Ordnance Department, U. S. Army

CALDWELL, G. A.,
Steel Mill & Metal Working Section Engineer,
Westinghouse Electric & Mfg. Company,
East Pittsburgh, Pennsylvania.

CHAPLIN, F. S., Structural Engineer,
Stainless Steel Division,
Edward G. Budd Manufacturing Company,
Philadelphia, Pennsylvania.

COOK, W. P., Engineer,
Ohio Edison Company,
Cleveland, Ohio.

DAY, JAMES, Wire Engineer,
London, England.

EDGERTON, C. T., Manager,
Bureau of Statistics,
Crucible Steel Company of America,
New York, New York.

ENGLE, DR. E. W., Metallurgist,
Carboloy Company, Inc.,
Detroit, Michigan.

FAZAKERLEY, T. W., A.I.I.A.,
West Wickham,
Kent, England.

GARDINER, ROBERT A., President,
Gardiner Metal Company,
Chicago, Illinois.

HAWKINS, RALPH D.,
The Bridgeport Gas Light Company,
Bridgeport, Conn.

JOHNSON, PROF. CARL G.,
Worcester Polytechnic Institute,
Worcester, Massachusetts.

JOUBLANC, J. C., Technical Director,
Electrode Division,
Harnischfeger Corporation,
Milwaukee, Wisconsin.

LEWIS, KENNETH B.,
Consulting Wire Mill Engineer,
Worcester, Mass.

LITTLE, J. S., Mfg. Engineer,
Western Electric Company,
Kearny, New Jersey.

MAHR, F. J., Engineer,
Pacific Gas & Electric Company,

MANTELL, DR. C. L., Technical Director,
Wilbur B. Driver Company,
Newark, New Jersey.

MAUBORGNE, MAJOR GEN. J. O.,
Chief Signal Officer of the Army,
Washington, D. C.

McCARTHY, B. L., Chief Metallurgist,
Wickwire Spencer Steel Company,
Buffalo, New York.

MORRISON, J. J., Operating Dept.,
American Steel & Wire Company,
Worcester, Mass.

MURPHY, WILLIAM R.,
Spencerian College,
Cleveland, Ohio.

NEWALL, A. P., Managing Director,
A. P. Newall & Company, Limited,
Glasgow, Scotland.

RYLANDS, G. K., General Manager,
Rylands Brothers, Limited,
Warrington, England.

RELYEA, W. D.,
Public Service Electric & Gas Co.,
Newark, New Jersey.

ROCKEFELLER, J. W., JR.,
Consulting Engineer,
New York, New York.

SEE, WALTER G., Sales & Service Manager,
Submerged Combustion Company of America,
Hammond, Indiana.

SEYMOUR, L. D., Assistant Works Manager,
Canada Works,
The Steel Company of Canada, Limited,
Hamilton, Ontario, Canada.

SHEPPARD, W. L., Structural Engineer,
Stainless Steel Division,
Edward G. Budd Mfg. Company,
Philadelphia, Pennsylvania.

SLAWSON, H. H.,
Chicago, Illinois.

SMITH, HARRY W., JR.,
American Gas Association,
New York, New York.

STRICKLEN, JOHN R., Vice President,
National Rubber Machinery Company,
Akron, Ohio.

STRINGFELLOW, H. A.,
St. Thomas, Ontario, Canada.

TATNALL, RODMAN R.,
Metallurgical Engineer, Morgan Works,
Wickwire Spencer Steel Company,
Worcester, Massachusetts.

WAHL, A. M., Research Engineer,
Westinghouse Research Laboratories,
East Pittsburgh, Pennsylvania.

WAMPLER, C. P., JR., Engineer,
A. O. Smith Corporation,
Milwaukee, Wisconsin.

WASHER, C. C., Vice President,
Philadelphia Steel & Wire Corporation,
Philadelphia, Pennsylvania.

WATKINS, STANLEY P., Manager,
Sales Development,
Rustless Iron & Steel Corporation,
Baltimore, Maryland.
Baltimore, Maryland.

WESTPHAL, FREDERICK A.,
Superintendent Wire Mills,
Sheffield Steel Corporation,
Kansas City, Missouri.

WYMAN, L. L., Research Engineer,
General Electric Company,
Schenectady, New York.

WHERE TO BUY

For more complete information, consult the annual Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

AIR DRAW FURNACES—
Carl-Mayer Corp., Cleveland, Ohio

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Machine Co., Trenton, N. J.

ANODES—Nickel
Seymour Mfg. Co., Seymour, Conn.

ANTI-RUST—Compound
Magnus Chemical Co., Garwood, N. J.
Monsanto Chemical Co., Rubber Service Laboratories Div., St. Louis, Mo.
National Oil Products Co., Harrison, N. J.

ARMORING EQUIPMENT—
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

AUTOMATIC SPARK TESTING EQUIPMENT—
Entwistle, James L., Pawtucket, R. I.

BAKERS—Hi-Speed
Carl-Mayer Corp., The, Cleveland, Ohio.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Moslo Machinery, Inc., Cleveland, O.

BOBBINS—Braider and Wire Weaving
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BORTZ—Diamond
Smit, J. K. & Sons, Inc., New York, N. Y.

CARRIERS—Braider, High Speed
Mossberg Pressed Steel Corp., Attleboro, Mass.

CEMENT FLOOR CLEANER—
Magnus Chemical Co., Garwood, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Magnus Chemical Co., Garwood, N. J.
Monsanto Chemical Co., Akron, Ohio.

CLEANERS—Hand and Metal
Magnus Chemical Co., Garwood, N. J.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, O.
Cleveland Tramrail div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Duriron Co., The, Dayton, O.
Lee Wilson Engineering Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.
National Oil Products Co., Harrison, N. J.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

COILERS AND SPOOLERS FOR INSULATED WIRES—
Entwistle, James L., Pawtucket, R. I.

COPHOLDERS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUSTOM ROD ROLLING—
Wilbur B. Driver Co., Newark, N. J.

CUSTOM WIRE DRAWING—
Hy-Carbo Steel Co., Lowell, Mass.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIAMOND POWDERS—
Smit, J. K. & Sons, Inc., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIES—Diamond
Cochaud Wire Die Co., New York, N. Y.
Globe Wire Die Co. (M. V. Dreyspool), New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Inc., Irvington, N. J.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Co., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Inc., Irvington, N. J.

DIES—Rod and Tube Drawing
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Globe Wire Die Co. (M. V. Dreyspool), New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Globe Wire Die Co. (M. V. Dreyspool), New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES—
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Entwistle, James L., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FILLERS—Paper for Cable
E. W. Twitchell, Inc., Phila., Pa.

FLUX—Tinning
Spowers, W. H., Jr., New York, N. Y.

FURNACES—Annealing
Carl-Mayer Corp., Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Lee-Wilson Engineering Co., Cleveland, Ohio

FURNACES—Automatic
Carl-Mayer Corp., Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Lee-Wilson Engineering Co., Cleveland, Ohio

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Lee Wilson Engineering Co., Cleveland, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.

FURNACES—Galvanizing
Lee Wilson Engineering Co., Cleveland, O.

FURNACES—Hardening and Tempering
Carl-Mayer Corp., Cleveland, Ohio.
Electric Furnace Co., Salem, O.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
John Robertson Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.

FURNACES—Normalizing
Carl-Mayer Corp., Cleveland, Ohio.
Electric Furnace Co., Salem, O.

FURNACES—Salt Bath
Electric Furnace Co., Salem, O.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., Cleveland, Ohio.
Electric Furnace Co., Salem, O.

GALVANIZING EQUIPMENT
Lee Wilson Engineering Co., Cleveland, O.

GEARS—Wire Mill
Farrel-Birmingham Co., Ansonia, Conn.

GRINDERS—Roll
Farrel-Birmingham Co., Ansonia, Conn.
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., Cleveland, O.

HOISTS—Electric Travelling
Cleveland Tramrail div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Monsanto Chemical Co., Akron, Ohio.
National Oil Products Co., Harrison, N. J.

INSTRUMENTS—Electrical
Entwistle, James L., Pawtucket, R. I.

INSULATION — Cable or Cable Filler
E. W. Twitchell, Inc., Phila., Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LEAD—Pig
St. Joseph Lead Co., Josephtown, Beaver County, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Magnus Chemical Co., Garwood, N. J.
National Oil Products Co., Harrison, N. J.
Vanco, Co., The, Manchester, Conn.

LUBRICANTS—Wire Drawing
Magnus Chemical Co., Garwood, N. J.
National Oil Products Co., Harrison, N. J.
Vanco, Co., The, Manchester, Conn.

MACHINERY — Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Coilers
Broden Construction Co., Cleveland, O.
Entwistle, James L., Pawtucket, R. I.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
Royle, John & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Galvanizing
Lee-Wilson Engineering Co., Cleveland, Ohio

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Lee-Wilson Engineering Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
H. J. Ruesch Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
National Rubber Machinery Co., Akron, O.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY — Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works Co., Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
H. J. Ruesch Machine Co., Newark, N. J.
Syncro Machine, Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Farrel-Birmingham Co., Ansonia, Conn.
National Rubber Machinery Co., Akron, O.
Royle, John & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Ansonia, Conn.
National Rubber Machinery Co., Akron, O.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Ansonia, Conn.
National Rubber Machinery Co., Akron, O.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
National Rubber Machinery Co., Akron, O.
New England Butt Co., Providence, R. I.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Stranding
National Rubber Machinery Co., Akron, O.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine, Rahway, N. J.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Entwistle, James L., Pawtucket, R. I.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Inc., Newark, N. J.
Micro Products Co., Chicago, Ill.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y. Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt, Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
National Rubber Machinery Co., Akron, O.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Wire Tinning
American Insulating Mach'y. Co., Phila., Pa.
New England Butt, Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MILLS—Tandem Rolling and Edging
Torrington Mfg. Co., The, Torrington, Conn.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

OVENS—Industrial
Carl-Mayer Corp., Cleveland, Ohio.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Monsanto Chemical Co., Akron, Ohio.
National Oil Products Co., Harrison, N. J.

PIPING AND FITTINGS—Acid Resistant
Duriron Co., Inc., The, Dayton, O.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

RECORDERS—Fault and Reel
Entwistle, James L., Pawtucket, R. I.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Takeoff
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Moslo Machinery, Inc., Cleveland, O.

RODS—Hot Rolled to Order
Wilbur B. Driver Co., Newark, N. J.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.

ROLL STRAIGHTENERS—
Moslo Machinery, Inc., Cleveland, O.

ROLLS—
Farrel-Birmingham Co., Ansonia, Conn.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUND—
American Lanolin Co., Lawrence, Mass.

SHEET—Steel
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, Ohio.

SKIN PROTECTOR—
Magnus Chemical Co., Garwood, N. J.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
National Oil Products Co., Harrison, N. J.
Vanco, Co., The, Manchester, Conn.

SPARK TESTING EQUIPMENT—
Entwistle, James L., Pawtucket, R. I.

SPOOLS—Annealing and Wire Drawing
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Chicago, Ill.

SPOOLS—Shipping and Shop
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

STRIP—Steel
Bethlehem Steel Corp., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Mossberg Pressed Steel Corp., Attleboro, Mass.

TAKE-UPS FOR CABLE, HOSE, LEAD PRESSES AND SHEET RUBBER—
Entwistle, James L., Pawtucket, R. I.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Entwistle, James L., Providence, R. I.
Scott Co., Henry L., Providence, R. I.

TINNING FLUX—
Spowers, W. H., Jr., New York, N. Y.

TRAMRAIL SYSTEMS—
Cleveland Tramrail div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
H. J. Ruesch Machine Co., Newark, N. J.

TURKS HEAD—
Standard Machinery Co., Auburn, R. I.

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Duriron Co., The, Dayton, O.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y. Co., Phila., Pa.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.

WIRE DRAWING—High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, Ohio.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Stainless Steel—
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non Ferrous
Hudson Wire Co., Ossining, N. Y.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

ZINC—Slab
St. Joseph Lead Co., Josephtown, Beaver County, Pa.

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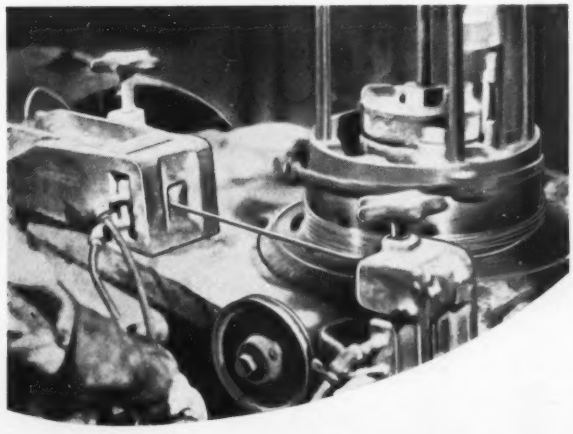

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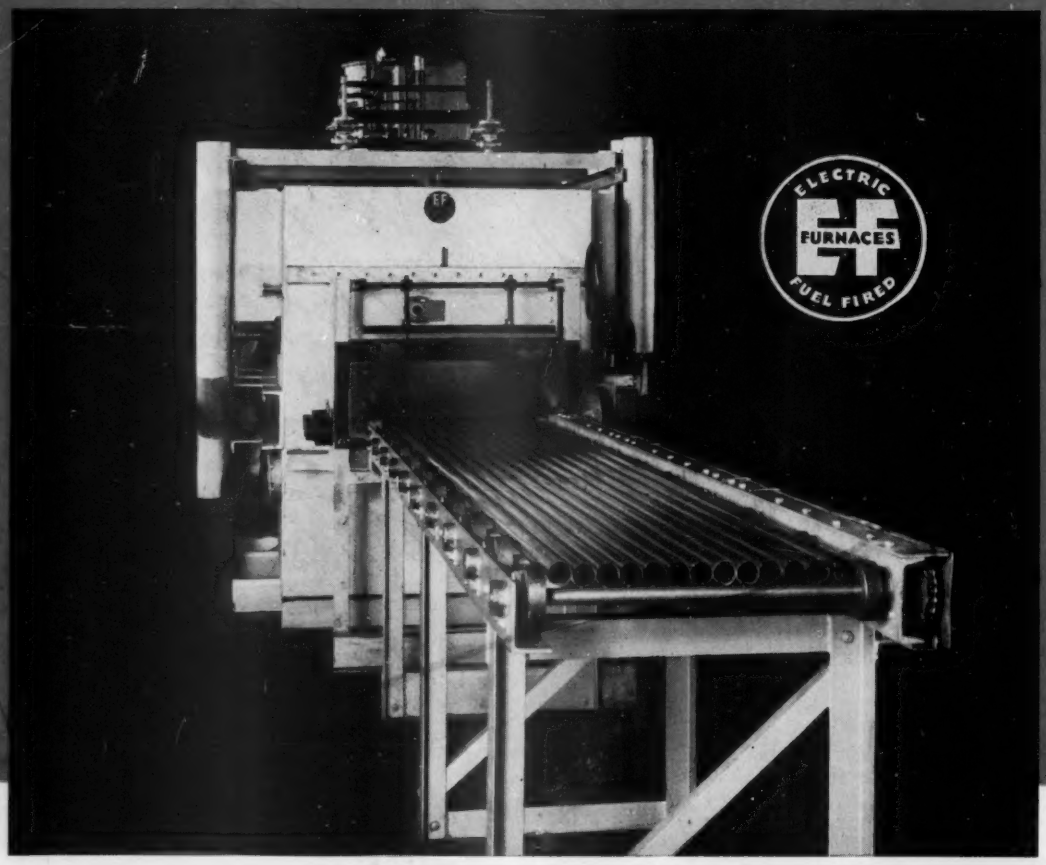

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